Post-palaeolithic Rock Art of Northeast Murcia, Spain: An Analysis of Landscape and Motif Distribution

WINTCHER, AMANDA

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Amanda R. Wintcher
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Abstract

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An Analysis of Landscape and Motif Distribution

Amanda Renee Wintcher

Multiple studies demonstrate a connection between landscape and the distribution of rock art in Mediterranean Spain. Looking beyond styles as the primary analytical dimension, and instead focusing on similarities across style boundaries, can deepen our understanding of this connection.

While previous studies of the relationship between post-Palaeolithic rock art and landscape have considered different classes of image, including humans, animals, and geometric shapes, they have maintained the primary split into the main styles defined in the Mediterranean region. This is problematic because each style has considerable variability, distinct distributions within the Iberian Peninsula, and different histories of development. Different styles frequently occur together, occasionally superimposed or showing multiple painting episodes. The styles were therefore at least partially contemporary, and did not correspond to distinct territories. Style may have been deliberately used to carry meaning, suggesting that the use of specific types of image was more closely related to landscape than the overall styles.

A typology of motifs which transcends styles was created, and the frequency of the appearance of these motif types in specific landscape contexts and the combinations in which they appear together on panels was evaluated. The results suggest that there are indeed patterns beyond style, which may indicate different functions or meanings behind both image and place.

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Spain

Several people have assisted me with research trips, site visits, and information. Background information was initially gathered during trips to Alicante and Valencia. Sara Fairén, Mauro Hernández, and Valentín Villaverde generously took the time to discuss research projects in progress and available resources with me. Following this I spent six weeks in Valéncia, mainly spent at prehistory library at the Consejo Superior de Investigaciones Científicas (CSIC) collecting journal articles, book sections, and other references published in Spain. The library staff were very helpful, and the library itself was a most pleasant place to work. During these trips I also visited museums and rock art sites in Alcoy, Alicante, Jumilla, Moratalla, Tírig, Valéncia, and Yecla, and received additional advice and assistance from the staff. Emiliano Hernández (Museo Jerónimo Molina, Jumilla) gave me invaluable assistance, arranging everything from accomodation to lunch and site visits. Liborio Ruíz (Museo Arqueológico Municipal de Yecla), María Carmen Melgarejo, Miguel San Nicolas del Toro (Asesor de Arqueología de la Dirección General de Cultura, Murcia) and Joaquín Salmeron (Museo de Cieza), who advised me on the state of research in the area, took me to some difficult to access sites, and assisted me with locating references.

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Other scholars

I first became interested in the study of of the past as a child, when my Grandma Edith bought me a National Geographic kids' book about ancient civilizations. The pictures of rock art fascinated me. One of my favorite childhood games was to pretend I was an ancient Native American, making "paint" by grinding away bits of the soft rock and mixing it with water, and drawing pictures on some decorative sandstone blocks in the front yard with a stick. I can no longer remember where I first saw rock art in person, though it may have been on any of a number of family vacations.

As an undergraduate I visited Newspaper Rock in Utah, but my interest in rock art was forgotten until I saw a talk given by Dr. Larry Loendorf at the NMSU museum. Shortly afterward, I took a summer job working under Dr. Loendorf at the Piñon Canyon Maneuver Site in southern Colorado, where I first encountered rock art as a scholar, rather than a tourist. I was very fortunate to work with several prominent scholars during my time at Piñon Canyon and NMSU, and this work secured my future interest in the subject. Although they have not been directly involved in my PhD work, I must thank Dr. Larry Loendorf, Dr. William Walker, Dr. Lonnie Ludeman, Dr. Terry Reynolds, and Mark Owens for their support during my MA studies, and for encouraging me to pursue a PhD. Dr. Daniel Arsenault (Université du Queébec à Montréal) has been friendly and supportive, and generously shared his photographs with me.

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For Aunt Teresa and Uncle Ival.
I'm sorry I didn't finish in time for you to read it.

And for Grandma Edith,
who first introduced me to the mysteries of the ancient world.

"Never give up, never surrender!" -- the Galaxy Quest motto

Deep in the nether world, in dreary caves
Where my retreated soul, in silent state,
Forms mystic figures and tremendous spells,
I heard the peerless Dulcinea's moans.

---

from "Merlin's Speech", Don Quixote
CERVANTES

Chapter 1

Introduction

Rock art is found throughout most of the Iberian Peninsula, and is associated with several chronological eras, from Palaeolithic to historic times. In the late 1990s, the post-Palaeolithic rock art of the Mediterranean area of eastern Spain as a whole was accepted as a United Nations Educational, Scientific and Cultural Organization World Heritage site (UNESCO 1998). The sites included in this designation, together with discoveries since 1998 and similar imagery located in adjacent areas, are distributed throughout the coastal area in the current Spanish Autonomous Communities of Andalusia, Aragón, Castilla-La Mancha, Catalonia, Murcia, and Valencia (see figure 1.1). This study concentrates on the post-Palaeolithic paintings of Mediterranean Spain, so called in recognition of the general view that they are at least Mesolithic or younger in age. These images are thought to be primarily Neolithic or Chalcolithic in date, although as discussed in chapter 3, the precise chronology is disputed. The paintings range from isolated single images to complex panels showing multiple styles and episodes of painting, and include simple geometric motifs as well as detailed human and animal figures. Contrasts in the images -- formal styles, themes, motifs -- and the archaeological and landscape context in which they are found preserve echoes of prehistoric social life, and may be connected to the changes and negotiations surrounding this dynamic and changing land use pattern. The distribution of post-Palaeolithic rock art in the Altiplano and Vega Alta regions expresses a complex relationship between the landscape and the people who created the rock art.

As the survey presented in chapter 6 demonstrates, the variability observed in the imagery itself or the context in which it is located is not fully explained by the classification of the images as either Levantine or Schematic, even if the Sub- or Semi- Naturalistic styles are taken into account. The styles which have been defined clearly capture important

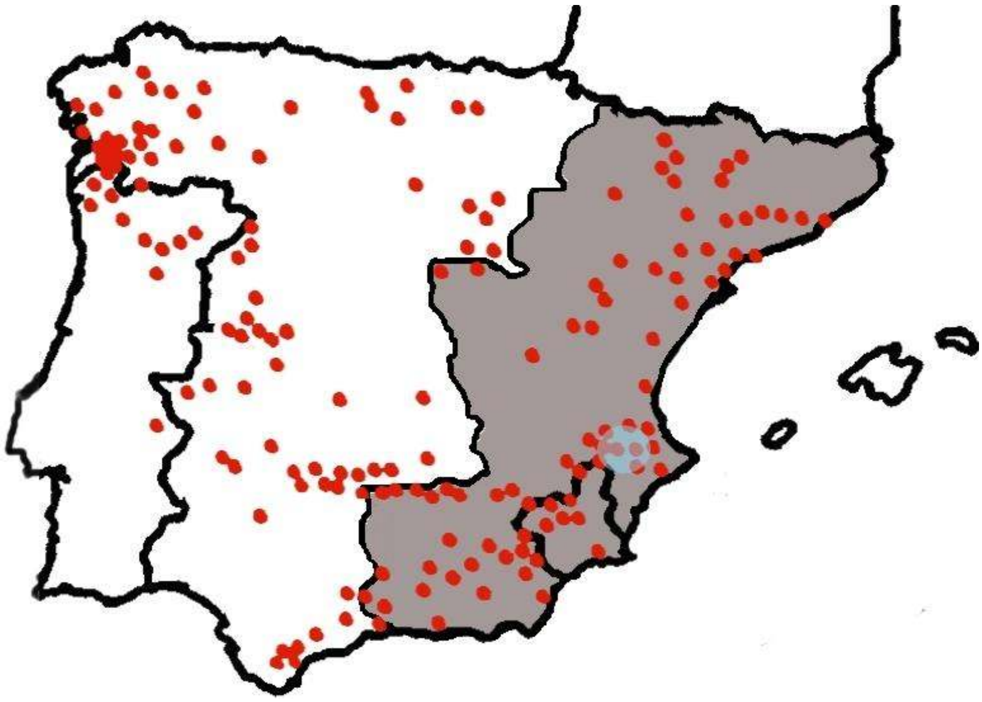


Figure 1.1: General distribution of post-Palaeolithic rock art in the Iberian Peninsula. The red dots represent Schematic style sites, the grey shaded area the distribution of Levantine style rock art, and the blue circle is the approximate distribution of the Macroschematic style.

similarities and differences between images; however, it is not always clear how a given site or motif should be classified. In order to facilitate the investigation of the multiple ways in which locations were differentiated through the selection of both imagery and location, a more detailed classification is needed. Although other typologies and classification systems have been defined for post-Palaeolithic rock art (see section 2.2), they are not necessarily applicable to other regions or research problems. In some instances the distinctions between types are ambiguous, and the diagnostic criteria for each type are not well defined. Another factor is disagreement about the entity represented by a given motif, which is a particular concern when discussing anthropomorph gender. For these reasons, a new motif typology is defined for the images in the study area. It is explicitly recognized that this typology is not necessarily applicable to other study areas or research questions, but rather is designed to address the specific characteristics of interest in this thesis.

1.1 General characteristics of post-Palaeolithic rock art

This section provides definitions of common terms as they are used in this thesis, and a brief introduction to the rock art styles found in the study area. The styles, and issues with them, will be addressed in more detail in chapter 2. It should be noted that there are other styles of imagery in the study area, including paintings of Palaeolithic, Bronze and Iron Age, Roman, and Mediaeval dates (see, for example, Molina García 1970-71); as well as a few examples of carvings, generally thought to be Bronze Age or later in date (see Herrero González 2004). These images will not be analysed in this thesis; however, their existence reinforces the continuing significance of the landscape over time.

The vocabulary used to discuss the phenomenon of rock art varies by region and scholarly tradition. The term "rock art" is itself debated because of the modern connotations of "art" which are inappropriate for prehistoric images (see, for example Chippindale 2001*a*, Lewis-Williams 2002:xv); however, many continue to use this term as a matter of convenience (Bradley 1997:5). The terms *motif*, *figure*, and *element* are often used more-or-less interchangeably to refer to individual images, usually a recognizable and clearly delimited shape, such as an individual animal or human (Loendorf 2001:61). *Motif* (or motive) is more commonly used in the Spanish literature. Consequently I have followed this usage here, although this can be confusing as "motif" is used both in the sense of a recurring aspect of a design or theme, as well as to refer to a discrete figure or composition. In an effort to avoid this confusion, I have followed Francis and Loendorf (2002:44) in using the term "design element" to refer to these recurring aspects.

Generally speaking, post-Palaeolithic rock art is characterized by its location in shallow rock shelters, rather than caves, although a few exceptions exist. Examples of rock art located in caves discussed in this thesis include the sites at Peña Rubia and the site of Peliciego (see chapter 6). Painting techniques include the use of fingers, sticks, or brushes. Occasionally a combination of manufacture techniques is used, especially abrading a surface prior to painting (see, for example, Gargantones, figure 6.13). Pigment colours vary, but most of the paintings are executed in various shades of red, with a few black motifs in the study area (especially Buen Aire II and Cantos de la Visera). White pigments in Levantine style images occur in a few sites elsewhere (for example Prado de Navazo, Paridera de las Tajadas, Ceja de Piezarrodilla, all in Albarracín, Teruel; Beltrán Martínez 1982), but none of the images studied here exhibit this colour.

The term *schematic* in the general sense refers to a figurative manner of representing entities which depicts only the essential identifying characteristics of that entity; hence the Schematic style of art is so named because it generally lacks fine details such as the realistic depiction of the shape of human and animal bodies. In contrast, the Levantine style is considered to be *naturalistic* in the common sense of an attempt to depict an entity in a realistic manner. Levantine style images tend to depict details such as clothing and the natural shape of arms and legs. This distinction is important in the understanding of the rock art for two principal reasons: first, the emphasis on particular details in Schematic style motifs implies that small differences between similar motifs were important in distinguishing between the representations of different entities. Second, the link between rock art styles and other artefacts, which is the basis of the current understanding of the chronology, has been disputed on the grounds that they do not display the same naturalistic or schematic preferences (Alonso Tejada 1999:79-82).

Rock art motifs are often broadly categorized as either figurative or abstract (sometimes called representational and non-representational, Loendorf 1989:40). They are grouped into broad classes here to facilitate discussion. Figurative motifs commonly found in post-Palaeolithic rock art include objects such as bows and arrows, anthropomorphs with details including gender characteristics and clothing; zoomorphs of several species, and a few examples of possible figures with both human and animal characteristics (sometimes called therianthropes). Humans carrying bows and arrows, sometimes chasing animals or fighting in groups, are usually interpreted as men, although they only sometimes have obvious phalluses. Female figures are generally identified by long skirts and occasional apparent breasts. Animals include bulls, deer, horses, birds, goats or sheep, boars, and possible dogs or foxes. Activities portrayed include hunting, dancing, and honey gathering, as well as more enigmatic arrangements of figures. Images which seem to be non-representational include a variety of geometric motifs, such as curvilinear or rectilinear lines, groups of dots, grids, and zigzags, and apparently random markings. The distinction between representational and non-representational is not always clear, however. Parallels between some geometric motifs and other material remains suggest that they actually represent artefacts such as carved bone idols. Motifs composed of a circle bisected with a vertical line, which resemble a Greek letter *phi* (ϕ) are usually interpreted as anthropomorphs; however, the basis for this identification is not always clear.

Motifs are usually grouped into styles for ease of description and discussion (Francis 2001; Francis and Loendorf 2002). *Style* in this sense is the larger group into which each motif is classified; such styles often refer to wide geographical areas and encompass a broad range of variation. In the case of post-Palaeolithic rock art there are three main styles which have been recognized, known as Macroschematic, Schematic, and Levantine. Although other post-Palaeolithic styles have been identified, notably the Linear-Geometric[1] and Semi-Naturalistic (see sections 3.2 and 2.1), these are often considered to be a subset of the Schematic style (Acosta 1968; Montes Bernárdez and Salmerón Juan 1998:39; Salmeron Juán 1993:141). The boundaries between styles and the criteria for assigning a given image to a style are not always clearly defined. This ambiguity, as well as similarities between motifs of different styles, is further discussed in section 2.3. An alternative means of grouping the motifs into types based on combinations of attributes or design elements is considered in detail in section 5.4. However, these three main styles form the basis of much of the existing research on post-Palaeolithic rock art, and will be briefly defined in section 2.1.

1.2 Geographical and environmental overview

The Mediterranean region of Spain is characterized by abrupt peaks and mountain ranges interspersed with low-lying basins, valleys, and coastal plains. The districts of the Altiplano and Vega Alta of the Segura River lie in a junction between the Vinalopó River valley in Alicante and the

[1] Sometimes spelled "lineal"

Central Meseta of Castilla-La Mancha. It is bordered by Alicante province to the east, the counties of Noroeste (Northwest) Río Mula, and Valle de Ricote in Murcia to the south and west, and the province of Albacete to the north and west. The name Altiplano is derived from the high altitude of the plateau, between 400 and 700 meters above sea level. The highest point in the area is in the Sierra del Carche range, southwest of Jumilla, at 1,372 metres above sea level. The Vega Alta of the Segura river is one of three alluvial plains along the Segura river. The region is generally characterized by the presence of groups of mountains, largely oriented in a northeast-southwest direction, interspersed with wide basins and valleys. The area is crossed by several rivers and creek beds, many of which are intermittent, only carrying water during storms or the rainy season. Flooding during these times is especially noted for the Segura River in the Vega Alta and the Vinalopó valley in Alicante. These river courses and valleys form natural channels for communication and movement across the area.

The area marks a point of transition between the Mediterranean and Continental climate zones. Summer rainfall is rare in the Mediterranean climate of the region, while winter brings rain with snow at higher elevations. The proximity of a large body of water (the Mediterranean sea) moderates the overall temperature, with a relatively small difference between summer and winter temperatures as compared to other climactic

Figure 1.2: A typical Altiplano landscape, near Jumilla. Photograph by the author.

regimes, a feature common to such climate regions worldwide. Likewise, summers are generally not as hot as adjacent desert areas, although this can vary with weather fluctuations. Adjacent plateau areas in the interior of the Iberian Peninsula (the Central Meseta and the Ebro valley) have a more Continental climate, with colder winters and hotter summers than the Mediterranean zone. Rainfall patterns are similar although the winter tends to be slightly drier. Native Mediterranean vegetation tends to be adapted to hot dry summers and with wet winters, and often consists of evergreen trees, shrubs, woody herbs such as rosemary and lavender, and grasses.

The current warm climate, with dry summers and rainy winters (in contrast to the previous cold and dry conditions) emerged during the Atlantic climatic period (circa 8-6 millennia BP). These conditions made the later agricultural economy possible (Gilman and Thornes 1985:10, or perhaps even necessary, Richerson et al. 2001). Much of the native

Figure 1.3: Typical landscape in the Vega Alta region, near the site of Lomo de Herrero. Note that the woodland is heavier compared to the Altiplano region, but does not completely obscure the top of the peak. Photograph by the author.

vegetation has been cleared in order to plant crops, although pockets of native vegetation survive. Today the landscape near the rock art sites is dominated by scrub brush, esparto grass, and commercial crops, with juniper trees and larger thorny bushes on the upper slopes (see figures 1.2 and 1.3).

Like much of the Mediterranean region, irrigated agriculture is a major part of the economy. Crops observed during field work in the study area included almonds, grapes, olives, rice, and broccoli, and in the past extensive terraces were constructed for growing additional plants such as wheat. This has had a significant impact on the appearance of the modern landscape in comparison to historic or prehistoric times. Centuries of agriculture and increasing desertification have greatly altered the landscape of south-eastern Spain, compared to the forested conditions which prevailed until the late Neolithic (Barton et al. 2004:4; Leveau 1999). The contrast between the likely conditions at the time rock art was produced and the modern appearance is significant, in that landscape measurements such as visibility and viewshed may be skewed by the current lack of trees; in the native forest environment, the rock art sites might have been less obvious. However, the impact of this is mitigated by the location of many rock art sites on peaks and ridges above the tree line.

1.3 Short history of research

1.3.1 Discovery of post-Palaeolithic rock art and early research

Rock art has surely been known before it was studied scientifically, and it has had an enduring influence on popular culture. There may even be an allusion to post-Palaeolithic rock art in Don Quixote[2], in the "mystic figures" mentioned in the adventures at the cave of Montesinos (see epigraph; Ripoll Perelló 1997:92). Images from Levantine rock art have even been included in a 1967 series of postal stamps based on the rock art of Spain (Jenkins 1977; Ruiz 2011). The first prehistoric paintings in the Iberian Peninsula to be identified by modern scholars were the

[2]Don Quixote, by Miguel de Cervantes Saavedra, was originally published in serial form between 1605 and 1615 (Boyd, introduction to Cervantes Saavedra 1993:VII).

Palaeolithic images of Altamira in Santander, northern Spain. These were discovered in 1879 by amateur archaeologist Marcelino Sanz de Sautuola (or more properly, his daughter Maria), whose ideas about the antiquity of the art were widely ridiculed. Several other Palaeolithic sites were discovered around this time, and studies of them by several prominent scholars including Cartailhac and a young Breuil led to the posthumous vindication of de Sautuola (Cartailhac 1902), and a greater recognition of prehistoric art elsewhere in Europe (for example, Cartailhac and Breuil 1906). It was within this climate of discovery that the first confirmed mention of the post-Palaeolithic paintings occurs (Marconell 1892). Further discoveries, including some in the Mediterranean areas of Spain, prompted the involvement of several scholars who would become important figures in post-Palaeolithic rock art research.

In a comprehensive review of the history of research on post-Palaeolithic rock art, Díaz-Andreu (forthcoming; see also Ripoll Perelló 1997) describes how political divisions and "research genealogies" have had a major influence on the history of post-Palaeolithic rock art research. In addition to personal relationships, the influence of Spanish nationalism and the outbreak of World War I essentially created two groups of researchers, with rather different stances on the significance of the paintings and their chronology. As Díaz-Andreu explains, Breuil assumed from the beginning that the Levantine style paintings dated to the Palaeolithic (figure 1.4) and mainly referred to hunting magic, a position largely echoed by Obermaier and Wernert. The discovery of the paintings in the Valltorta Gorge in the early twentieth century, and resulting conflicts between scholars (especially Breuil and Cabré), provided a context to show this influence. Brueil and other scholars associated with the French Institute of Human Palaeontology (IPH)[3], particularly Hugo Obermaier and his assistant Paul Wernert, supported the Palaeolithic arguments, even after they began to work for the CIPP during the war.

On the other hand, scholars associated with the Spanish Commission for Palaeontological and Prehistoric Research (CIPP)[4], recognized that there were significant differences between the paintings at Valltorta and

[3] *Institut de Paléontologie Humaine*

[4] *Comisión de Investigaciones Paleontológicas y Prehistóricas*

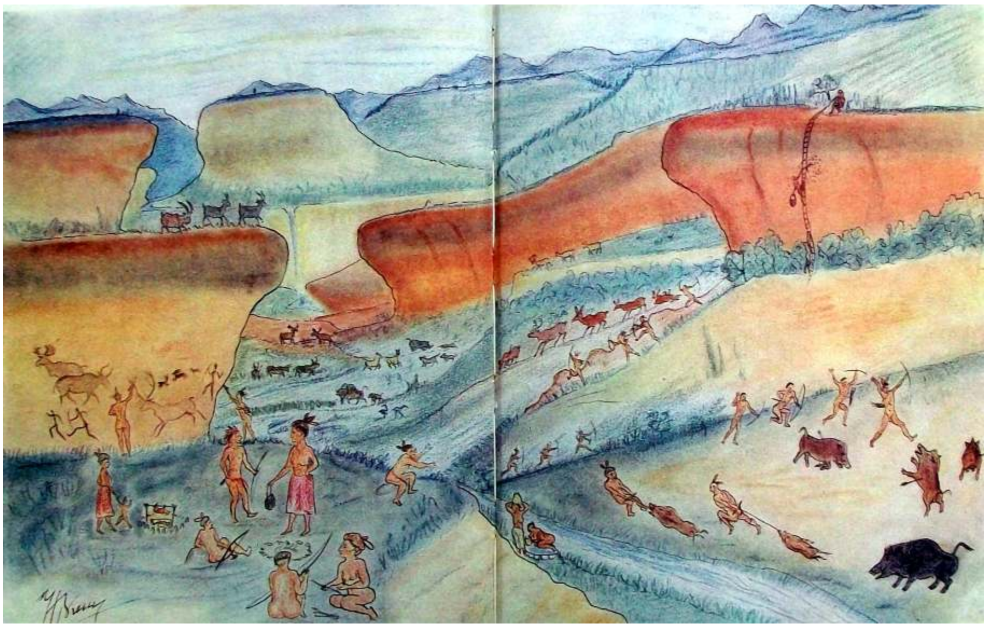


Figure 1.4: Levantine style art as a Palaeolithic phenomenon, as Breuil imagined it (1949:84-85).

the Franco-Cantabrian paintings and suggested a more complex chronology, although the Palaeolithic date was initially still supported. Hernández Pacheco, while agreeing with the Palaeolithic date, suggested that the paintings belonged to a different cultural tradition, based on the animals depicted, similarities to other artefacts, and superimpositions. He also recognized that there may be multiple phases of painting within the Levantine style, and that some paintings belonged to a later time period. As Díaz-Andreu reports, his ideas ideas were largely ignored by Breuil, or discussed without reference to him by Obermaier and Wernert. Cabré's publications on Valltorta in the mid-1920s made similar points, and also suggested that the paintings were not solely related to magical practices, but also had a narrative or historical component. However, the influence of Breuil and those who were friendly to him (Obermaier, Bosch Gimpera, and later Pericot, Burkitt, and Porcar) on both archaeological education and publication meant that the Palaeolithic chronology became standard, while both Cabré and Hernández-Pacheco moved on to other endeavours. The situation changed with the end of the Spanish Civil War, however, when both Obermaier and Bosch Gimpera left Spain. In their place Almagro Basch and Pericot assumed prominence in the field, and with them the view that the Levantine and Schematic art was post-Palaeolithic (Díaz-Andreu forthcoming). This issue of chronology continues to be a major research theme, however, which will be revisited in section 3.2.

1.3.2 History of rock art research in the Altiplano and Vega Alta of the Segura River

Rock art in the Altiplano and Vega Alta area, while less intensely studied than Valltorta, was nonetheless the subject of some investigation early in the twentieth century. The sites of Mediodía and Cantos de la Visera in Yecla were discussed by Breuil and Burkitt in 1915, and in Cabré's book on Spanish rock art (Cabré Aguiló 1915; García del Toro 1986). Some carvings in the area were mentioned in other works of the same era (Mergelina 1922). The site of Minateda, in Albacete, was also studied by Breuil (1920), who developed a detailed (but Palaeolithic) multi-phase chronology of the site (Barandiarán et al. 2002:129; Díaz-Andreu forthcoming). Despite this early attention, as well as discoveries such as the "strange markings" at the site of Peliciego (also known as Morceguillos) in the Altiplano, which was announced in the local newspaper *Linea* in 1939 (Martínez Abellán and Abellán Carrión 2003), there was little research focused on this area until the discovery of Barranco de los Grajos by a group of speleologists in the late 1960s (Pascual 1968). Research in this region intensified in the 1970s and 1980s, after the establishment of the Department of Archaeology at the University of Murcia, and as graduates of the department began to take up positions at several local museums in the province (M. Díaz-Andreu, pers. comm.). Rock art sites have now been found in multiple locations in Murcia, including an isolated site found in the area of Cartagena in the mid-1980s (Andreu and Gómez 1986; Martínez Andreu 1985) and the three main concentrations of rock art in Murcia: Moratalla, Lorca, and the study area, the Altiplano and Vega Alta of the Segura River regions.

Survey in the Moratalla and Lorca areas intensified in the 1980s, with the discovery and reporting of sites such as La Risca (García del Toro 1986-87) and others discussed in García del Toro (1988). Other discoveries in this area around this time included El Sabinar (Carbonell Escobar 1969; Martínez Sánchez 1969), La Fuente del Sabuco and La Cañaica del Calar sites (Beltrán Martínez 1970*b*, 1972) in Moratalla; the latter is notable for its apparent fight scenes. Further discoveries and documentation for the currently known sites in the Moratalla area; these are discussed in Mateo Saura (1999, 2005*b*). There are fewer known sites in the Lorca area. The sites are not as well published as those elsewhere in Murcia, with the primary sources of documentation being Breuil (1933-35), Montes Bernárdez and Salmerón Juan (1998), or Mateo Saura (1999).

In the Altiplano, Peliciego has been studied several times since its discovery (Fernández Avilés 1940; Fortea Pérez 1974*a*,*b*; Hernández Carrión 2003; Martínez Abellán and Abellán Carrión 2003). The sites of Buen Aire I and II were first reported in the mid-1980s (García del Toro 1985) and subsequently studied by several people, notably Mateo Saura (2005*a*). In more recent years several other sites have been discovered in this area, reported by Hernández and others (Hernández Carrión 1985, 1993*a*,*b*,*c*; Hernández Carrión and Gil González 1998). Alonso and Grimal have completed many survey and recording projects around the province, beginning in Moratalla but recently shifting to the Altiplano region (see, for example, Alonso Tejada 1997; Alonso Tejada and Grimal 1997, 1998*a*,*b*, 1999*a*,*b*, 2002*b*, 2003, 2004, 2005*b*, 2006*b*). Similarly, Mateo Saura has recorded and published many sites throughout the province, often in the form of catalogues with photographs, tracings of the images, site plans, and descriptions of the rock art and the general location (Gombert et al. 2005; Mateo Saura 1999, 2005*a*,*b*).

Several important discoveries in the Vega Alta of the Segura River during this time stimulated greater research in the area. The discovery of Los Grajos prompted Professor Antonio Beltrán in particular to publish numerous articles about the rock art in Murcia, beginning with the Valcamonica symposium of 1968 (Beltrán Martínez et al. 1987; Beltrán Martínez 1969, 1970*a*, 1988; Nieto Gallo 1993). Additional discoveries were made in the 1970s, including La Serreta, which was found by speleologists exploring Almadenes Canyon (Sánchez et al. 1972 - 1973; Valenzuela 1972 - 1973). Research at this site and others in the Cieza area has continued since then, particularly with the work of Joaquín Salmerón and others who have produced several publications on the Almadenes Canyon area (Salmerón Juan et al. 1997, 1994, 1995; Salmerón Juan 1986-87; Salmeron Juán 1989; Salmeron Juán and Teruel

1990; García del Toro 1980). Other work has focused on the rock art as well as the material culture associated with these sites including, for example, research on carved bone idols (San Nicolás del Toro 1984), materials recovered from excavations at the Peña Rubia sites (San Nicolás del Toro 1987; San Nicolás del Toro 1987), El Pozo (San Nicolás del Toro 1985), and the burials at El Milano (San Nicolás et al. 1988; San Nicolás del Toro and Alonso Tejada 1986). Despite this substantial body of work, the sites in this area are relatively under-studied. Many sites in the study area are relatively new discoveries or have been only minimally published, and have not yet been systematically analysed as a group. Their relationship to adjoining well-known groups of sites been addressed to some extent but not in landscape terms.

1.4 Aims and objectives of this thesis

Recent work has shown that there is some relationship between style, and to a certain extent motif type, and the landscape context in which the post-Palaeolithic images are found. However the re-use and continuing importance of particular types of image or certain places has not yet been systematically investigated. This study provides an alternative perspective on the relationship between post-Palaeolithic rock art and landscape. The approach taken here is different from recent work in that it considers the association between motif types at a more detailed level than simple class, and examines motif types as a group across style, rather than grouping them by style first. The continuity of importance over time, and the distinctions between site categories, may not be evident in style itself. Defining types which transcend style allows for the observation of patterns in the combinations of attributes which are not captured by style alone. By examining the distribution of rock art in space at the motif, panel, and site levels, we may be able to identify patterns which were meaningful to prehistoric people, even if those meanings themselves cannot be identified (Layton 2000; Loendorf 2004).

1.4.1 Aim

The ***aim*** of this thesis is to explore the distribution of post-Palaeolithic rock art in the Altiplano and Vega Alta areas of Murcia in terms of 1) motif types which transcend the broad Levantine and Schematic styles, 2) the combinations of these motif types which are commonly found together, and 3) the relationship between motif types and specific characteristics of the landscape context in which the rock art sites are found.

1.4.2 Objectives

The ***objectives*** of this thesis are to:

1. Review the existing research on the rock art of Eastern Spain with particular attention to the major themes of style, landscape, and the emergence of the Neolithic (see chapters 2, 3, and 4);
2. Survey the rock art sites in the Altiplano and Vega Alta areas and compile a database of information about the rock art sites and individual motifs, derived from fieldwork, photographic analysis, and the review of published works as needed (see chapters 5 and 6);
3. Analyse the distribution of the rock art in terms of the combinations of motif types on panels and the association between motif types and the landscape characteristics of visibility, viewshed, general accessibility of the shelters, and location with respect to the surrounding terrain (see chapter 7).

Although there is a substantial research literature on the topic of post-Palaeolithic rock art, very little of this has been published outside Spain or in English, with some notable exceptions (for example, Beltrán Martínez 1982; Cruz Berrocal and Vicent García 2007; Díaz-Andreu 1998, 2002, 2003, forthcoming; Fairén Jiménez 2007; McClure 2004; McClure et al. 2008). A minor objective of this study is to contribute to the growing literature in English and hence raise the profile of this internationally important body of images.

1.5 Thesis overview

The concepts of style and type are discussed in chapter 2. This includes an overview of the manner in which the concept of style has been applied in post-Palaeolithic rock art studies to create classification systems, and a discussion of some of the issues with the concept of style generally and its application to this body of images. The logic underlying the refining of the existing classification systems in order to explore the relationship between the rock art and the landscape in more detail is also explained in this chapter. It is argued that although multiple typological systems have been created for post-Palaeolithic rock art, these systems are either not sufficiently generic to be applicable across the entire distribution of this body of images, or conversely do not adequately account for the variability within or the similarity between the main recognized styles. A means of overcoming these issues by refining these existing typologies to better fit the rock art in the Altiplano and Vega Alta regions is described in chapter 5.

One of the major issues in the study of post-Palaeolithic rock art is its chronological position and relationship to other major developments in prehistory, particularly the transition to the Neolithic and the emergence of an agricultural economy. The general archaeological sequence is summarized in chapter 3, followed by a more extensive discussion of the major explanatory models of the Neolithic transition. The evidence linking post-Palaeolithic rock art to different aspects of this chronological sequence, and the implications for the interpretation of the imagery and its relationship to the surrounding landscape, is also discussed. One of the major lines of evidence is the similarity between the major rock art styles and portable artefacts, especially cardial ceramics and carved bone idols. Ultimately the currently available evidence is not conclusive; however, much of the recent research has concluded that the main rock art styles are roughly contemporary, began in the Neolithic, and were made by a single cultural group but for different purposes.

The assumption that the main styles were made by a single cultural group, but for different purposes, implies that there should be a distinction in the rock art found in different locations. Chapter 4 discusses the existing patterns of distribution in post-Palaeolithic rock art, addresses some possible means of connecting this distribution to world view, and introduces some ways in which rock art has been used deliberately as a tool of cultural change. Taken together, the first three chapters make the case that if post-Palaeolithic rock art can be considered to be a largely Neolithic phenomenon, the differences between the main styles are a product of different purposes rather than chronology or cultural identity, and the placement of rock art in the landscape is partly determined by underlying ideas about the nature of the world, then it is expected that there will be observable distinctions in the types of motif found in different locations in the landscape which can be interpreted as an expression of that underlying world view. Observing the distribution of motif types and their relationship to various characteristics of the landscape can lead to a recognition of the aspects of this relationship which carried meaning. Recent studies which have addressed this relationship have approached the rock art primarily in terms of whether it can be classified as one of the three main styles; however, as explained in chapter 2 this system does not fully account for either the variability present within styles, or the similarities across styles.

In order to overcome the issues with these existing classification systems, a modified motif typology, specifically tailored to suit the data collected in the study area, is created and used in the analysis of the distribution of the rock art in the Altiplano and Vega Alta areas. Chapter 5 explains this process as well as the methods of collecting and analysing data. The study area selection criteria are explained first, followed by a discussion of the field survey and data collection procedures, and the process of photographic analysis. The mathematical and statistical procedures used in chapter 7 are also briefly reviewed.

Finally, the methods used to define the motif types and landscape variables which form the basis of the analysis are explained. The creation of the motif typology is based on methods developed by Loendorf and Francis, which have been used to construct typologies in multiple regions including the Piñon Canyon Maneuver Site in Colorado and the Dinwoody area of Wyoming (Francis 2001; Francis and Loendorf 2002; Loendorf 1989; Loendorf and Kuehn 1991; Loendorf and Porsche 1985). The basic process is based on traditional methods (for example, Adams and Adams 1991; Hill and Evans 1972) which explore the formal attributes which comprise types and styles and aim to create a replicable means of describing a group of images. An explicit goal of this method is creating a classification system which is tailored to a particular research problem and study area; for this reason it is useful in refining existing typological systems which do not adequately account for phenomena of interest. This chapter also explains the methods used to characterize the landscape context in which the sites are found, particularly the visibility, viewshed, accessibility, and general topographic position of each site.

Following the discussion of data collection and analysis, a report of the results of the survey is given in chapter 6. Each of the sites studied is described, including an overview of the motifs found at each site, example illustrations, and a discussion of the general characteristics of the site. Where appropriate this discussion includes details about supplemental sources of data, and an account of any discrepancies noted during field work or between authors. For convenience, the discussion is grouped by modern political district and is in roughly alphabetical order, except for sites which occur in close groups.

The motif attributes which have been identified are presented in chapter 7, and the frequency with which they are found is tabulated. Several potential ways of dividing the motifs are explored, and the implications of each method are described. The sites in the study area are categorized according to the landscape context in which they are found (as defined by the combination of variables each site exhibits). These types were then analysed at the panel level to identify common themes and the details which comprise them. Finally, the distribution of types was examined at the level of sites and the wider landscape, to determine whether particular motifs or themes are associated with different aspects of land use.

Chapter 7 presents multiple analyses which examine the distribution of these motif types within the landscape. The results indicate that variation is in fact related at the motif and landscape levels; however, the statistical significance of this is relatively weak. Alternative means of investigating patterning are also presented. The analysis proceeds in four phases: 1) a discussion of the motifs analysed and their characteristics, 2) an examination of the motifs which occur together, 3) an analysis of the relationship between motifs in sites; and 4) an analysis of the relationship between motifs and the landscape. Finally, chapter 8 offers some suggestions for future work and possible parallels which can be drawn with rock art in other parts of the world.

Chapter 2

Style and type in post-Palaeolithic rock art

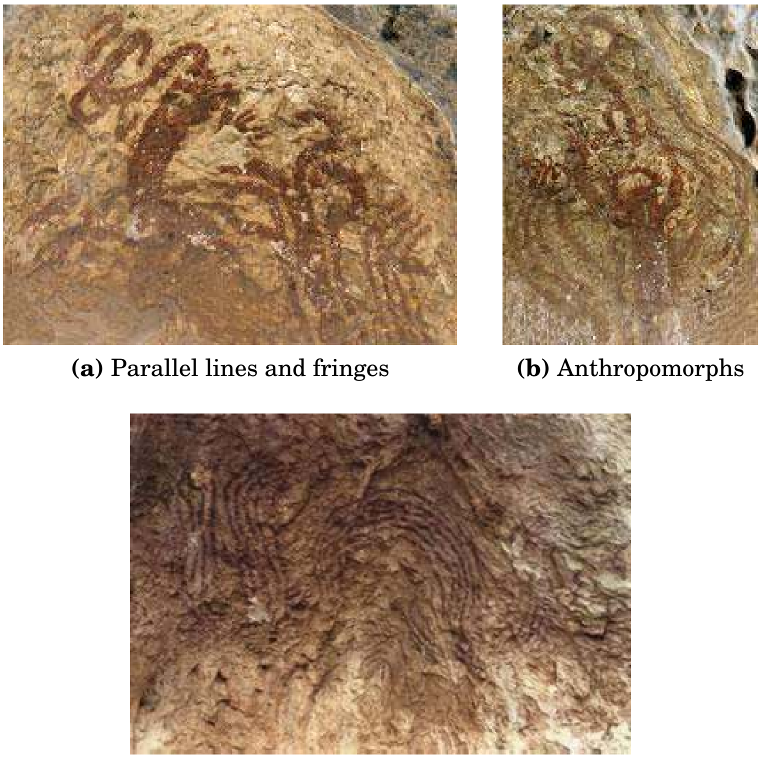
This chapter has three main objectives. First, the main post-Palaeolithic rock art styles are defined and the main motif classes and types are discussed. Second, the manner in which style and type have been addressed in recent studies of landscape is discussed. Finally, some issues with the concept of style are addressed, and the typological perspective discussed. Although multiple typological systems have been developed for post-Palaeolithic rock art, the multiplicity of motif types and differences in details in motifs as well as convergences across styles suggest that they cannot adequately account for the variability within or the similarity between the main recognized styles. An issue with style as it has been conceived of in recent landscape studies is that the gradual simplification of styles (Cruz Berrocal 2005*a*; Utrilla and Calvo 2002) and the consequent conflation of local and regional details. This is a particular concern in that the landscape patterns which have been identified may not prove to be recognizable across all districts or regions, a possibility which has been obscured by the use of overly broad styles.

2.1 Post-Palaeolithic rock art styles

There are three main styles of post-Palaeolithic rock art recognized in the Mediterranean area of Spain, which are known as Macroschematic, Levantine, and Schematic. While the known distribution of the Macroschematic style is restricted to the Alcoy area of Alicante, and the style is correspondingly well-defined, the Levantine and Schematic styles encompass several local variations. These local variations in the Levantine style motifs generally are not known by distinct names (but see Domingo Sanz 2004), but regional styles, such as the Semi- and Sub-Naturalistic styles found in the Mediterranean area, are usually considered to be variations of the broader Schematic style. Multiple typological systems have been devised throughout the history of post-Palaeolithic rock art research, however, in recent years these systems have been simplified (Utrilla and Calvo 2002). This section explains these simplified definitions of each style.

2.1.1 Macroschematic

The Macroschematic style is characterized by the thickly painted wavy lines which make up the individual motifs (figure 2.1). Notable examples are found at the sites of Pla de Petracos, Shelter IV at Raco de les Basses or Barranc de Beniali, La Vall de Gallinera, and La Sarga I. These wide lines frequently form anthropomorphic figures with raised arms and splayed fingers. Often these images are surrounded by dots and rays and have a "bristled" appearance. These rays also sometimes end in "fingers" or oval shapes. Anthropomorphs appear to have headdresses or perhaps combined human and animal aspects, including exaggerated ears or



(a) Parallel lines and fringes **(b)** Anthropomorphs

(c) Concatenated lines

Figure 2.1: Examples of Macroschematic style rock art

horns, large hands, and a seemingly skeletal appearance. Another common motif is the series of nested lines, again often ending in fringes or "fingers". The Macroschematic motifs are generally quite large, relative to the Schematic and Levantine styles, and most groups of lines are more than a meter in length. The conventionally recognized distribution of the Macroschematic style is limited to a dozen sites in the El Comtat, Marina Alta and Marina Baixa areas around Alcoy in Alicante (Martí Oliver and Hernández Pérez 1988:21), although it has been suggested that a few sites outside the Alcoy area may also have examples of this style (Cruz Berrocal and Vicent García 2007:688-689).

Linear-Geometric

The lineal geometric was initially defined by Fortea (1974) on the basis of similarity with incised plaques from Cueva de la Cocina, Valencia, originally dated to the late Mesolithic and immediately prior to the advent of the Neolithic (Cruz Berrocal and Vicent García 2007:680). Motifs such as the zigzags and grids from Cantos de la Visera, La Sarga, La Araña, and Cocina (see figure 2.2, for example) were initially ascribed to this style and associated with the Mesolithic. However, the dating of the

Figure 2.2: Detail of a Linear-Geometric motif, Cantos de la Visera II. Enhanced from a near-infrared photograph by the author.

plaques and the state of preservation at Cocina has been questioned (Cruz Berrocal 2005*b*), and the motifs are now considered to be part of the Levantine or Schematic styles (Cruz Berrocal and Vicent García 2007:680).

2.1.2 Levantine

The Levantine style (sometimes called *naturalistic* in older literature[1]) is only found in the Mediterranean Arch area, but it is widespread within this range. Levantine images are normally quite detailed, composed of fine lines which appear to have been painted with a brush rather than a fingertip. The emblematic Levantine figure is a running archer (figure 2.3), although the actual range of motifs is much broader, comprised of humans, several species of animals, plants, objects such as baskets and

Figure 2.3: Archer, Levantine style. La Saltadora, Valltorta Gorge, Valencia. Enhanced photograph by the author.

[1]Díaz-Andreu notes that the term "Levantine" was not widely used until after the end of the Spanish Civil War in the 1930s, and suggests that the previous suppression of the term may have been related to its association with Hernández Pacheco and his rivalry with Breuil (see discussion in section 1.3.)

projectile points, and some abstract figures. Items of clothing or jewellery, headdresses, weapons, and anatomical details are often clearly depicted. These motifs often appear in "scenes" which show hunting, dancing, gathering honey, and apparent agricultural activities, though there are some examples of isolated Levantine style motifs known (such as Los Pucheros in the study area).

2.1.3 Schematic

The Schematic style is part of a widespread tradition of both painting and carving found in several contexts across the western Mediterranean. This includes southeast France, northern Italy, and much of the Iberian Peninsula (Fairén Jiménez 2007:123). Although there are many local and regional variations across this area, within Mediterranean Spain the style is mainly distinguished by its stylized, finger-painted "stick figure" (sometimes called thread-like) appearance. The Schematic style images vary in size, with examples ranging from five centimetres to over a meter

Figure 2.4: Two quadrupeds, Schematic style. Buen Aire. Photograph by the author.

in length. Multiple types of motif have been recognized within this style, particularly in Acosta's classic work (1968). The themes depicted are similar to those of the Levantine paintings, in that they include humans in various circumstances including apparent hunting scenes, animals of multiple species, and a variety of abstract motifs. However, the figures tend to be less detailed than Levantine style images. Schematic anthropomorphs are usually simple lines, sometimes including anatomical details, headdresses, or objects such as weapons and clothing. Zoomorphs usually depict deer or mountain goats, normally with antlers or horns (figure 2.4). Abstract or geometric motifs are also common, especially the phi-like symbol (usually interpreted as an anthropomorph) and arrangements of dots or lines.

2.1.4 Semi-Naturalistic and Sub-Naturalistic

The Semi-Naturalistic style is less commonly mentioned in the literature, and is usually considered to be a variation of the Schematic (Montes Bernárdez and Salmerón Juan 1998:39). Some examples in Murcia which have been described as Semi-Naturalistic or Sub-Naturalistic style, notably examples from Los Grajos I and La Serreta (Montes Bernárdez and Salmerón Juan 1998:39; Montes Bernárdez et al. 1999; Salmeron Juán 1993:141, 1999), have bodies with little variation in line width, but have other details such as defined fingers, clothing, and weapons (see La Serreta, for example, figure 6.22). Although these styles have been considered to be variations on the Schematic, images such as those mentioned above are not simple stick figures. They are painted in a less-detailed manner than most Levantine style images, with thicker lines and less detailed portrayal of muscle contours or clothing than most Levantine style paintings. Some examples appear similar to the stick-figure Schematic style, but have detailed hands, feet, heads, and accessories (mainly bows and arrows in the study area, although Los Grajos I, panel 1, motif 41 may be holding a basket or similar vessel) which are more similar to Levantine.

2.1.5 Motif classes

Within each of these styles, the motifs can be grouped into one of several basic classes of motif: anthropomorph, zoomorph, abstract or non-representational, and amorphous. The abstract motifs are further broken down into bisected, circular, and linear groups in recognition of distinctions among this group. Some motif classes and types occur within multiple styles, particularly archers, possibly women wearing skirts, and most identifiable species of animal. Some details, especially those associated with the idol-like motifs such as "fringes" and similar design elements, wavy and nested curved lines, and comb-like motifs including ramiforms are generally restricted to the Schematic style. Other details, such as clothing and bracelets, are associated with the Levantine style but are also found in the Semi-Naturalistic motifs. If the latter are considered to be a sub-set of the Schematic style, then these details transcend styles; in any case, it is clear that they were not restricted to a particular time period or region within the distribution of post-Palaeolithic rock art. To some extent this situation is not surprising, as after all people and animals are major themes in rock art worldwide, and the definitions of the rock art styles as a whole reflect the differing frequencies of figurative and naturalistic motif types. The following discussion describes each motif class and provides examples of the motif types used in the analyses in chapter 7. For detailed definitions of the individual motif types, see appendix G.

Anthropomorphs are generally defined by a recognizable body, legs, arms, and head. Levantine style anthropomorphs are, by definition, relatively realistic and contain details such as contoured limbs and clothing. Schematic anthropomorphs generally have "stick figure" bodies, composed of simple lines. Examples of both styles exhibit design elements such as defined fingers or long skirts, and appear holding weapons or in various postures. Clothing and other accessories recognized in post-Palaeolithic rock art as a whole include headdresses, bracelets, belts which appear to have fringes hanging from both sides, short and long skirts or kilts, baskets, possible trousers, garters, possible body paint, and weapons. These accessories are very rare in the current sample, with the exception of long skirts. One possible basket is noted at Los Grajos I, as well as a motif with possible trousers, and there are apparent bracelets at

Figure 2.5: Examples of anthropomorph motif types used in the present study. Some design elements, such as proportional body shapes, are associated with a particular style (Levantine, for example). Others, such as the archer motif, occur in multiple variations and across styles. This chart presents examples of different body shapes and linear motifs which may in fact be remnants of anthropomorphs, particularly those which appear to be male or asexual. The motif types shown here are as follows:

First row: two branching body motifs, two elongated body motifs, and a group of intersecting lines which are classified as possible anthropomorphs. **Second row:** one branching body, one salamander, two proportional body archer figures. **Third row:** one round body, two stick figures, two archer figures. **Fourth row:** one round body with round head, one male stick figure body, one proportional with triangular head, one archer

La Serreta. Further details are given in chapter 6. Anthropomorphs can be grouped into male, female, and asexual or indeterminate gender motif types. Indeterminate motifs (figure 2.5) are frequently Schematic stick-figure types, although other body shapes such as round often lack clear gender characteristics. Male motifs (figure 2.5) are defined as such because they appear to have a penis, or are carrying a bow and arrow. Although it is possible that the latter was used by both men and women, there are several archer figures which are also phallic within the corpus of post-Palaeolithic rock art, but none appear to have breasts. Anthropomorphs are classified as female (figure 2.6) if they appear to be wearing long skirts or have discernible breasts, although other body shapes have been considered to represent females in the literature, as noted in the table.

There are some examples of other figurative motifs, such as trees at La Sarga and a honey-gathering scene featuring a ladder and apparent beehive at La Araña. None of the sites in the study area feature these motif types, however. There are few objects represented which do not appear to be clothing or otherwise worn by human figures. Bow and arrow motifs are sometimes separate but are associated with other human figures. Other linear motifs were initially identified as projectiles (spears or arrows); however, in order to make the classification more consistent these were grouped into the Linear class in the analyses in chapter 7. Of course, many of the motifs which are classified here as lines may have once represented other objects or entities, but they are no longer recognizable as such.

Zoomorph types (figure 2.7) are generally recognized as cervid, caprid, bovid, jabalí (wild boar), equid, and unidentified (Domingo Sanz 2004:111). Bernabeu (2001*a*:601) mentions that dogs appear in the faunal record during the Neolithic and apparently were given scrap bones, whereas previously the bones were used as a marrow source for humans. If some of the the ambiguous animals in the rock art, such as smaller quadrupeds with long tails at La Serreta and Fuente del Sabuco in Moratalla, do in fact represent dogs, this could imply a further connection with the Neolithic. However, their identification is uncertain at present. Zoomorph species are mainly distinguished through head and body shape, particularly antlers or horns and the distinctive hunched back found on

Figure 2.6: Examples of motifs which appear to be female anthropomorphs or have been described as such by other researchers. The primary identifying features of females are long skirts and breasts, but the "thick line" motif type could be a representation of wider hips. As can be seen in this figure, not all images with skirts also have identifiable breasts. The motif types shown here are as follows:

First row: three thick line body motifs, classified as possible females, and one figure with a long skirt and defined fingers. **Second row:** three motifs with long skirts, two with breasts, and a group of three motifs with possible long skirts.

bulls. Some of the motifs which are classified as indeterminate quadruped may have represented female or immature animals, especially when these appear in groups together with more readily identified male animals.

There are multiple motifs which appear to represent carved boned idols (figure 2.10). These artefacts are widely associated with the Chalcolithic, or third millennium AD (Garcia Atiénzar 2006). Typical idols as defined by Acosta (1983) are largely distinguished by the apparent representation of eyes, or circular areas, often with curved lines over or

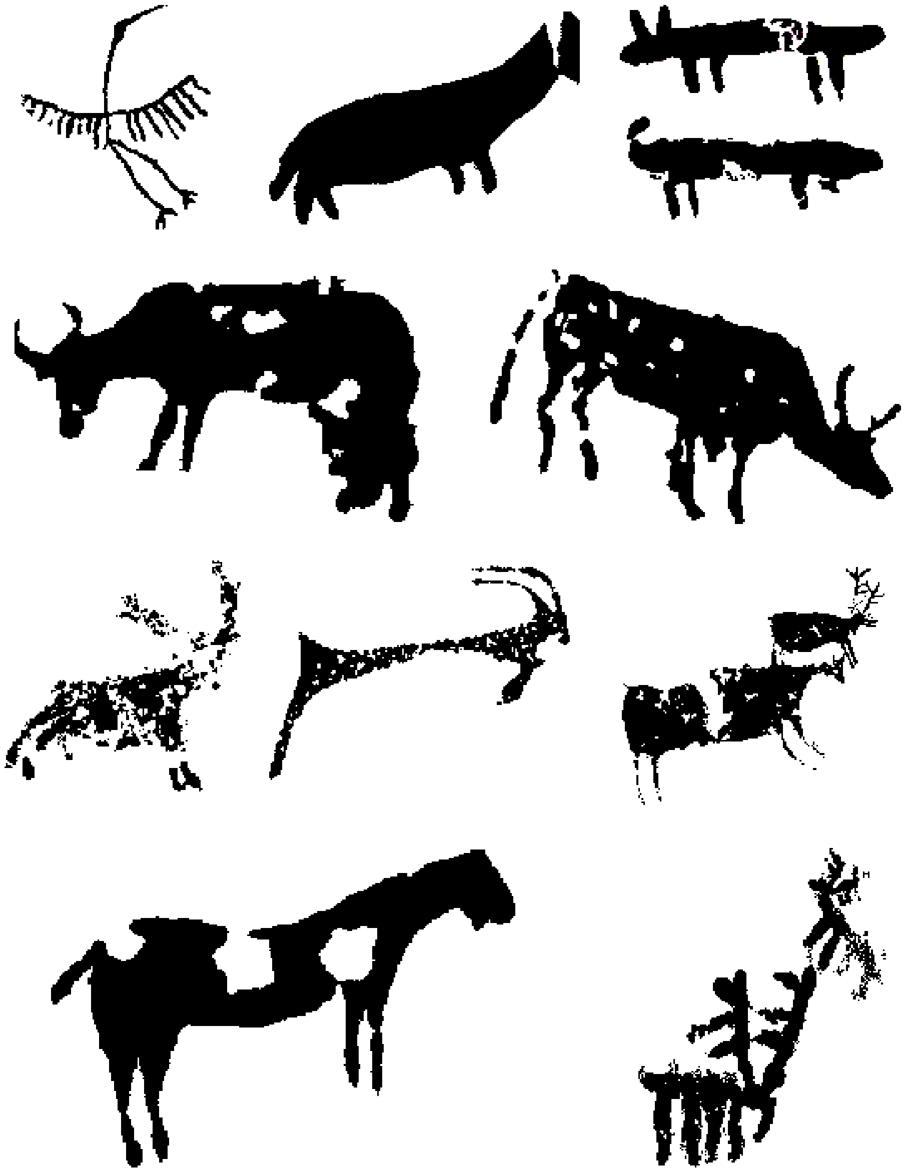


Figure 2.7: Examples of zoomorph motif types. Some motifs are ambiguous, such as the apparent boars or indeterminate zoomorphs. Only one bird motif has been identified in the study area. In general, animal species are distinguished by the shape of their heads and bodies. Most species are represented in both the Levantine and Schematic styles. The motif types shown here are as follows:

First row: bird, boar, two indeterminate species zoomorphs. **Second row:** two bull motifs. **Third row:** two caprids and two cervid motifs. **Fourth row:** equid and two cervid motifs.

Figure 2.8: Drawing of various idol-like motifs from the Segura and Júcar river regions, Murcia and Alicante. From Garcia Atiénzar (2006:255).

under them, sometimes interpreted as facial tattoos (figure 2.8). Figures with possible skirts and triangular upper bodies at Los Organos, Despeñaperros, Jaén (figure 2.9; Beltrán Martínez 1982: unnumbered appendix, pages 55-56) have several features which seem to link these images to other motifs. These figures have distinctive head and shoulder decoration, consisting of a set of two or three horizontal parallel lines which extend from the neck or head, topped with a circular motif on either side of the head. A further set of horizontal or diagonal lines extend from the top of the head. This pattern of stacked lines and circles is reminiscent of motifs at Cantos de la Visera, especially shelter II, motif number 34 (figure 6.5), although the figures at Los Organos are more clearly anthropomorphic. The body shape is similar to bi-triangular motifs found elsewhere, including some possible examples in the study area, and similarly shaped bone idols.

(a) Motif 1

(b) Motif 2

Figure 2.9: Female figures with skirts and head or shoulder decorations reminiscent of other "eyed idol" motifs, from the site of Los Organos in Jaén. Beltrán refers to these motifs as Schematic in style. Details from photos in Beltrán Martínez (1982:unnumbered appendix, pages 55-56).

Figure 2.10: Examples of abstract motifs, some of which have design elements which appear similar to those found on carved bone idols. Recurring themes include groups of parallel lines, grids and zigzags, and a vertical bisecting line. The motif types shown here are as follows:

First row: anchor-like motif, two groups of bars, ramiform with curving branches and possible headdress. **Second row:** group of three anchor-like motifs, ramiform with straight branches. **Third row:** comb-like motif and grid. **Fourth row:** circular area with rays, bi-triangular motif, grid, and poly-lobed motif. **Fifth row:** zigzag line.

Figure 2.11: Examples of abstract motifs, particularly variations on the phi-like figures. Phi-like and poly-lobed figures are often considered to be anthropomorphic, however, many examples do not have distinct heads or other features beyond the basic bisected circle.The motif types shown here include a group of two straight phi-like figures, group of three phi-like figures with heads, group of dots, and a crook line.

Abstract images (figure 2.11) are simply those which do not readily correspond to recognized objects, although they may not have appeared abstract to those who made them. Abstract motifs in the present study include rectilinear or curvilinear geometric shapes, groups of lines or dots, and apparently random markings. This class of motifs includes the so-called ramiform (branching lines), pectiniform (comb-like), and ancoriform (anchor-like) motifs which figure prominently in the Schematic style. Curvilinear motifs include the poly-lobed figures, which seem to be a variation on the phi-like figures. These are often identified as anthropomorphs and are relatively common in Schematic compositions. Several sites have groups of finger dots. El Pozo II is very similar to Cañaica del Calar III in Moratalla, which has a similar group of dots adjacent to Schematic animals, although the latter site has many more images. The latter does not have any phi-like motifs, but it does have a rayed circle which may be attached to a human figure (see figure Montes Bernárdez and Salmerón Juan 1998:65).

2.2 Style and type in recent research

The existing classification schemes are not general enough to use in comparing the distribution of common themes across style. There are several classification systems which have been developed to describe post-Palaeolithic rock art (see for example Acosta 1968; Alonso Tejada and Grimal 1996; Domingo Sanz 2004). Acosta (and later scholars using a similar scheme) has separated the schematic motifs into several categories, while Alonso and Domingo Sanz both created schemes for categorizing the Levantine style motifs, especially anthropomorphs. Several other studies have either defined new means of classifying the motifs (for example, Cruz, Fairén) or have not explicitly defined any classification system at all. This is particularly true of works which focus on reporting new discoveries or recordings (for example, Mateo Saura 1999). In some cases the descriptions of individual motifs reveal underlying biases, such as the long-standing identification of anthropomorphs with apparent long skirts as women (for example, Beltrán refers to "two women in conversation", (1982); see also Escoriza Mateu 2002). While the effects of these biases may be of minor importance in the overall picture, arbitrarily grouping images in this way may hide important details. Although these have been defined in various ways in previous work, early in the process of analysing the photographs and compiling the database (see chapter 5) it became clear that these definitions were sometimes ambiguous, or that additional details could be seen which called these identifications into question.

Criteria for stylistic definitions in Domingo's study of Levantine anthropomorphs were based on the formal descriptions of figures; essentially, this consists of the graphic conventions used at the time the individual motifs were made, and includes size, form, and shape (Domingo Sanz 2004:119-121). Anthropomorphs include obvious male and female figures as well as indeterminate figures, with a variety of postures, headdresses, items of clothing, and other accoutrements visible, using an exhaustive list of criteria for describing motifs, focused on the formal description of Levantine style anthropomorphic figures. Anatomical form includes the depiction of exaggerated muscularity, posture, the presence or absence of facial features and the shape of those existing, and particularly the proportions of the trunk, arms, and legs of each figure. Anatomical proportions in Domingo's study are based on an idealized human figure, drawn at eight heads high, a common drawing convention. A ratio of height and width was calculated for each figure in the study, using this idealized human figure, and an index of proportionality created in order to compare the rock art figures more easily.

This index was used to delimit the anthropomorphic paintings as either 1) proportionate and disproportionate with a tendency to shorten the trunk, and 2) disproportionate with a tendency to shorten the limbs relative to the trunk. Within the disproportionate figures, two different standards were identified: 1) figures in which the median height of the body is located in the middle of the length, with an index of 1:1 (although this variant is included within a range of 0.8, and 2) figures in which the median body height is moved to the lower third, with a proportional index of 1.4. The calculation of the relationship between trunk and extremities includes the head in the superior half of the body and the feet in the lower half. However, a certain number of individual cases are left out of the recount as a consequence of the erosion of one of the anatomical parts used in the calculation. In general the result obtained, taking into account diverse groups, appears sufficiently representative to observe the general behaviour of each type of human figure (Domingo Sanz 2004:121).

Other approaches to this rock art have examined the distribution of motif classes (for example, Cruz Berrocal 2005*b*:188-189), but the categorization of the motifs in these studies remains at a relatively high level of abstraction. Cruz, for example, has grouped the motifs into classes of anthropomorph, zoomorph, and abstract, as well as identifying combinations of those classes. However, this approach does not take into account potentially significant variation within those classes, such as the gender of anthropomorphs, species of zoomorphs, or types of geometric motif.

The anthropomorph postures seen in rock art images are not strictly realistic, as they reflect a certain amount of artistic license; however there is a certain amount of equilibrium maintained (arms thrown out to maintain balance in a running figure, for instance; Domingo Sanz 2004:122). The identified postures are seated, resting, marching, running, and in flight. A similar means of determining type was used in a study of images in the Rio Taibilla area (Alonso Tejada and Grimal 1994, 1996), where 17 variants of posture or articulation where delineated for the Levantine style anthropomorphs.

2.3 Problems with styles in post-Palaeolithic rock art

Much of the previous research in the Mediterranean has first divided the body of images into styles, and then proceeded to analyse the relationships between those styles, and different aspects of their context. Styles, in the sense of an exclusively defined group of images which are related by formal characteristics, can be problematic. In the case of post-Palaeolithic rock art the main issues are that the two main styles, Levantine or Schematic, comprise a wide variety of images, the identification and classification of individual images is sometimes ambiguous, and both styles are known to exhibit regional and temporal variation. At the same time the styles overlap in distribution, at least in the region where multiple styles are found. Both styles frequently appear on the same panels, and are occasionally superimposed, giving the impression that they were contemporary for at least part of their history. While previous landscape studies have considered different classes of image, such as humans, animals, and geometric shapes, the images were first grouped into one of the main styles before analysis, despite the existence of several detailed classification systems and a wide variety of recognizable types within each style. However, these types also maintain the split between styles, and the relationship between these types and the landscape has not been considered in detail.

A problem with using styles as single entities to analyse the social meaning of post-Palaeolithic rock art is that the styles themselves encompass a great deal of variability in stylistic, regional, geographical, and chronological terms, which in turn implies that the images included within each style themselves had multiple social meanings. Analysis of the distribution of the rock art in terms of these styles perpetuates the impression that the styles are single synchronic entities. Rock art research in Spain has tended to be concerned primarily with stylistic or typological problems, with an eye toward refining the chronological understanding of the images, while research about why the styles differ or ways in which they are distributed have been of secondary importance (see Conkey 1990).

The formal similarity between the images which comprise "a style" is often interpreted as a marker of group identity, with chronological implications. This is arguably also a problem in the case of the post-Palaeolithic rock art of Mediterranean Spain. Even if a given style can be associated with a conventional archaeological cultural period, this often obscures interesting patterns by lumping together too much variability. Style in the sense of a larger group into which each motif is classified, that is, Levantine or Schematic, is a fairly "coarse" level of classification which can obscure important details about the motifs within each style (Francis 2001:227-229; Francis and Loendorf 2002:42-43; Loendorf 1989:75; Schaafsma 1985; Tratebas 1993:165), particularly when it is applied as the main dimension of classification. The results of recent work verifies that there is significant local variability within styles, which has chronological implications (Domingo Sanz 2004), and has even been suggested to reflect social or territorial differences (Mateo Saura 2004). Although there have been several past studies which lay out styles and types, some of which are quite elaborate, these seem to have been implicitly simplified in recent years (Utrilla Miranda 2000:49). Other styles beyond the main three have been identified, especially the Semi-Naturalistic; but as mentioned these are usually considered to be a subset of the Schematic style, following other researchers (Acosta 1968, Montes Bernárdez and Salmerón Juan 1998:39, Salmeron Juán 1993:141).

2.3.1 Limitations of styles

While archaeologists frequently invoke the concepts of type and style, it is not always clear just how these classifications were derived, or what the diagnostic characteristics are. Rock art style definitions are often too simple, and do not account for enough variability within a body of rock art; often the characteristics chosen to describe a given style are too vague to be considered diagnostic (Francis 2001:227-229; Francis and Loendorf 2002:42-43; Loendorf 1989:75; Tratebas 1993:165). The term "style" can have multiple meanings depending on the circumstances. At a basic level, style is defined as a characteristic way of creating form (shape) and content (Willey and Phillips 1958:32). However, the term *style*, or stylistic, can also refer to the formal features or characteristics of the individual motifs which make up "*the* style" as a whole. The main definition of style used in this thesis is that defined by Francis and Loendorf (2002:46): "a repetitious form or series of forms that shows internal continuity with respect to specific techniques of manufacture and combinations of design elements, has a limited temporal distribution, and has a widespread spatial distribution". The underlying understanding of rock art *styles* as a time-bound indicator of a particular "culture" or group implies that the rock art which can be grouped together in this way is associated with a particular economy, territory, set of rituals, and mental constructs or meanings associated with the images. This conception of style is consistent with Schapiro's classic definition, which views style as a chronological and cultural diagnostic tool, bound in space and time, and characterized by a constant occurrence of morphology, motifs, manufacture techniques, themes, and aesthetic preferences (Schapiro 1953). This concept is problematic, because, as Schaafsma (1985) notes, *styles* in this sense are often applied to geographic regions which are too large, diluting the significance of the concept. These broad regional styles are not necessarily detailed enough to convey much information about when an image was made or a site was used, or to allow for a rich understanding of the role of rock art in a given situation.

2.3.2 The use of types

The criteria for assigning a given image to a style are not always clearly defined, although there have been several past studies which lay out styles and types. Variations in motifs, design elements, or distribution which have the potential to carry important information are often obscured by style definitions which emphasize similarity. The definition of elements or motifs in a style is problematic. First, there are a wide variety of motifs, and it is difficult to discern by visual observation which motifs belong together. Previously defined styles tend to recognize broad similarities between motifs, but several additional differences can be identified, which may or may not indicate further differences between motifs generally considered to be the same style (Loendorf 1989; Loendorf and Kuehn 1991; Tratebas 1993). The selection and identification of design elements is recognized to be an inherently arbitrary process, but very few researchers are explicit about how the types are defined. Often, the types are long established or presented as self-evident, and the means by which they came about are not very clear. This complicates comparison between styles, or even with previous work with the same images.

Simple formal types are only presented as a classification device; the distribution of these types is used to evaluate where to direct investigative energies. Descriptive types created early in an analysis are not necessarily chronologically, spatially, or culturally diagnostic; rather, they are simply a means of reducing the inherent variability to a communicable description (Francis and Loendorf 2002:44-45). The rules for classifying a motif as a given type can be either mono- or polythetic (some attributes are absolute, others are flexible within a given range, see Francis and Loendorf 2002:45). At a more generic level, motifs can be divided into classes on the basis of a few readily observable attributes (Francis and Loendorf 2002:45; Hill and Evans 1972:233). Such a classification is not necessarily taxonomic or hierarchical, but includes basic designations such as anthropomorph, zoomorph, object, and abstract.

An attribute or design element can be defined as a "formal unit used to divide and describe an individual design or figure. It is designated by the researcher and recognized as being arbitrary.... An individual figure can be composed of one design element or many" (Francis and Loendorf 2002:44-45). Motifs are grouped into types based on design elements, or details which do not change the basic class. For example, a human carrying a bow and arrow is a common type of motif within the anthropomorph class in Mediterranean Spain. Individual motifs may differ in many design elements such as size, facing direction, the posture of the figure, number of arrows, clothing, hairstyle, or colour. Motifs, generally, correspond to design elements or individual pictures, and are composed of a number of design elements or characteristics; initially defined design elements can be combined, split, or omitted as dictated by the results of the continuing analysis. In practice, experimentation and refinement (trial and error) are required in order to obtain the best results for the problem at hand (Tratebas 1993:165). Class is defined very simply as figurative or abstract; this was refined into anthropomorph, zoomorph, bisected, circular, and linear based on an examination of the motifs present in the sample (see explanation in chapter 5). Using these design elements, or rather, the patterns of the combinations which they exhibit, the next step is the creation of descriptive types themselves; or "a grouping of figures based on conscious recognition of dimensions of formal variation and consistent patterning of attributes (Francis and Loendorf 2002:44-45)". These types are not meant to be reflections of emic categories, but are a means of describing and analysing the motifs which is at the same time more detailed than style, but general enough to be more than a simple list of all the possible variation noticed by the researcher.

The purpose of creating a new typology of motifs which cross-cuts existing style groups is twofold. First, this allows for a greater focus on details which appear in both styles and which may link the meaning of motifs, and by extension places, giving a means of identifying common concepts used in both groups of images. Second, bypassing style in this manner allows us to ignore, if only temporarily, the complications of ambiguous style definitions (especially Schematic, Sub- and Semi-Naturalistic) and the idiosyncratic details of a long-lived and multiply-authored tradition. By focusing on the distribution of motif types which transcend style, it is hoped that patterns of association between aspects of the images and particular geographical characteristics of the context in which they are found can be identified. This process attempts to define a strictly formal typology as much as is possible, recognizing that it is impossible to verify what specific concepts or meanings the individual types of motif may have represented to their makers (Loendorf 1989:80). Such a typology is not meant to reflect emic categories, but rather facilitates description and comparison, and can be used to investigate patterning even if it is impossible to identify the meaning or symbolic referent of a motif type (Francis and Loendorf 2002:45). The decision to include particular attributes in a classification of descriptive types is explicitly determined by the research goals, and recognized as arbitrary in this sense (Adams and Adams 1991; Francis 2001:234; Francis and Loendorf 2002:245-246; Hill and Evans 1972). Selecting attributes which can answer a given research question increases the chances of determining what is actually relevant, and why.

Focusing on the distribution of individual motif types has the potential to allow the identification of *places* and their associated activities. Relating the distribution of rock art in the landscape with ritual activities can be accomplished by examining the placement of individual motif types in order to evaluate whether there are any patterns that can be interpreted as evidence of particular kinds of ritual activities. This method is dependent on the ability to distinguish motifs, a problem which is a factor not only of preservation issues or apparently ambiguous images, but also the inability of a modern observer to recognize details which denote different conceptual categories (Sauvet et al. 2009:329). However, the ability of similar methods to select details which were meaningful, even if the specific meaning could not be identified through analysis alone (Loendorf 2004; Taçon et al. 1996), suggests that this method is of use in identifying meaningful combinations.

Chapter 3

Chronology and the Neolithic transition

This chapter aims to summarize the overall archaeological context in which post-Palaeolithic rock art is found, with particular attention to the emergence of the Neolithic. Although the question of chronology has been debated throughout the history of research on this body of images, in recent years most scholars have come to agree that the main styles of post-Palaeolithic rock art emerged in the Neolithic, were partly contemporary, and made by a single cultural group. However, this proposition is not universally accepted. Contrary to this argument is the position that the Levantine style began first, possibly in the Epipalaeolithic (or even Palaeolithic, according to previous scholars such as Breuil), largely due to its apparent hunter-gatherer themes (for instance, see papers in Various Authors 1999). Understanding the chronology of post-Palaeolithic rock art is complicated by uncertainty about the introduction of domesticated plants and animals and the "Neolithization" of the Iberian Peninsula. Despite these debates, the origin and development of the Neolithic economy and the subsequent changes to social life and land use is intimately tied to the study of post-Palaeolithic rock art.

Recent research has suggested that the development of agriculture in the Mediterranean was not a gradual process, although as noted below scholarly opinion on this matter has changed several times. It appears that in at least some areas, people moved from elsewhere into a landscape that was largely empty, possibly for a variety of reasons including disease, social stress in the face of an encroaching population, and perhaps environmental change. There are tantalizing hints of conflict and stress within the rock art at some sites, such as Cova Civil in Valencia or Cañaica del Calar in Moratalla, which appear to depict fights between competing groups of people. On the other hand, there is little evidence aside from the rock art itself to suggest conflict, and instead it seems that the main rock art styles emerged at the same time and were contemporaneous for at least part of their history. The possible long-term continuity in the use of special places implied by this circumstance supports the notion that the meaning of particular motifs persisted through time.

3.1 Overview of prehistory in Mediterranean Spain

This section provides an overview of prehistory in the study area (see table 3.1) and the evidence from each time period which has been found in the rock art sites under study. Although the chronology of post-Palaeolithic rock art is disputed, it is generally agreed that the images date to at least the Epipalaeolithic or later. Particular attention is paid to the Neolithic, as much of the current scholarship considers that this body of imagery emerged at the same time. There is some evidence of Palaeolithic activity at many of the sites which are analysed here, including a small group of sites in Almadenes canyon in the study area which contain imagery dated to the Magdalenian. This evidence will be briefly discussed below, although the images themselves are not included in the analyses in chapter 7. Although the current understanding of rock art chronology in the study area does not link the Palaeolithic styles with the later images, it is interesting to note the depth of time in which rock art has been created in the region.

It should be noted that in some instances, there are differences in the names used in the literature to describe the same time period. This is the product of historical accident, in that researchers over time have tended to continue using the terms assigned by previous scholars to a particular phase or site, which themselves differed according to local scholarly traditions and archaeological sequences. In order to avoid confusion the terms "Epipalaeolithic" and "Chalcolithic" will be preferred, in keeping with the existing research in the study area. The alternative names will be mentioned as they occur.

The Mesolithic or Epipalaeolithic begins at approximately 10,000 BP, at which point the customary notation changes to BC dates. This period is primarily distinguished by the disappearance of megafauna species

Mil.	BP or BC	Period or culture	Note	Rock art styles
	29000 – 10000 BP	Upper Palaeolithic	Neanderthals (Atapuerca)	Altamira paintings
	18000 – 10000 BP	Magdalenian	Pleistocene ends, Holocene begins ca. 11,000 BP	Almadenes Canyon, Murcia (paintings, Magdalenian?), Parpalló, Valencia (plaques, Magdalenian)
Tenth	11000-9000	Asturian, Azilian (N. Spain, France), Microlaminar	Similar to Azilian, no bone tools in Mediterranean area	Lineal-Geometric?
	10000* BP	Mesolithic or Epipalaeolithic	Microliths, climate change	
	7500 BC		Geometric lithics. Similar to Tardenoisian (France and Belgium)	
Sixth	5600 – 2200 BC	Neolithic	Cereals, ceramics appear (Andalusia, La Almagra)	
	6607-7040 BC		Ceramics at Catena	
Fifth	5460-5230 BC		Cardial ceramics at l'Or	Macroschematic, Schematic (begins later)
	5590 +/- 140 – 4210 +/- 120 BC		Cereals at Cendres	
	5600 BC		Domesticates introduced by this time	
Fourth	4800 BC	Eneolithic?	Dolmen tombs in S. Portugal	Schematic, Levantine?
Third	3000 BC	Chalcolithic		Schematic
	2600 BC		Los Millares (urbanism)	
	2150 BC		Bell Beakers appear	
Second	1800 BC	Bronze	El Argar (fortification)	
First	800 BC	Iron Age		
	600 BC	Iberian culture		
	400 BC	Romans		

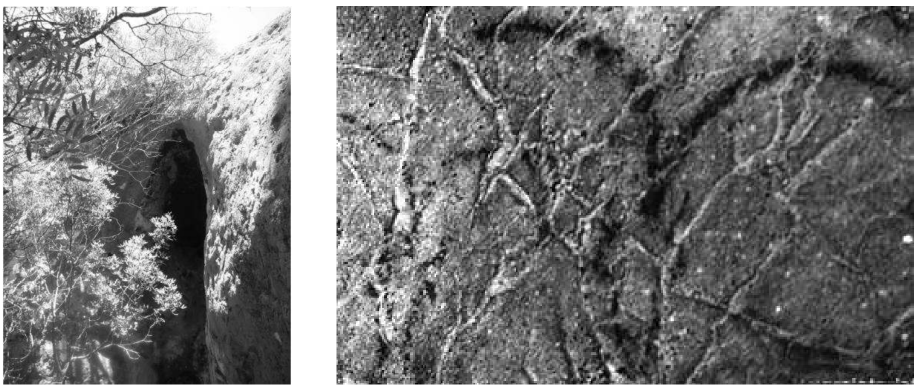
*Start using BC dates from 10,000 BP onwards

Table 3.1: General overview of chronology and rock art developments in the study area.

associated with climate change, and the resulting changes in technology. The exact dates and circumstances leading to the emergence of the Neolithic have been the subject of intense debate over time, with many questions unresolved and continual shifts of opinion as new evidence surfaces. However, in the Mediterranean area of the Iberian Peninsula the hallmarks of this period include domesticated crops and livestock, the introduction of ceramics, particularly the cardial style; a shift from a hunter-gatherer to an agro-pastoral economy, and the emergence of post-Palaeolithic rock art. The Chalcolithic, also known as the Copper Age or the Eneolithic, refers to the early stages of the transition between the Stone Age and the Bronze Age in the traditional three-age system. Although the date of this change differs slightly across the Iberian Peninsula, giving rise to different terms, this period is generally characterized by the intensification of agricultural production and settlement, and the introduction of metals. Changes in post-Palaeolithic rock art styles, especially the development of the Schematic style, may be related to this process of intensification. This trend continues into the Bronze Age, and although there are some examples of rock art in the study area which appear to date to this period or later the styles are quite different and will not be discussed in this thesis, except to note their occurrence.

3.1.1 Palaeolithic

Evidence of hominid activity in Spain extends into the Lower Palaeolithic, with evidence of *Homo heidelbergensis* (and *Homo antecessor*, if the latter is considered to be a separate species). Significant evidence of Neanderthal activity has been recovered from multiple locations within the Iberian Peninsula, especially the Atapuerca mountains of northern Spain. The Upper Palaeolithic, particularly rock art, is of course



(a) Overview, El Arco **(b)** Palaeolithic caprids

Figure 3.1: The entrance to the Palaeolithic site of El Arco, Almadenes Canyon, and an example of the caprid paintings. Figure a, photograph by M. Díaz-Andreu; figure b enhanced from a photograph from www.murciaturistica.es

well-represented in this region, with the occurrence of sites such as Altamira. However, rock art dating to the later stages of the Upper Palaeolithic is found throughout the Iberian Peninsula, including sites in the study area (see figure 3.1). Some Palaeolithic remains were identified in excavations at Los Grajos (Martínez Andreu 1995), although the rock art here is very different in style when compared to the Levantine or Schematic styles.

Mobiliary art dated to the Palaeolithic was first identified in the Mediterranean area in the early twentieth century, with the discovery of the cave of Parpalló in Valencia (Villaverde Bonilla 1994). Early Palaeolithic (Mousterian) remains, but not rock art, have been reported in the Jumilla area (Gil González and Hernández Carrión 2005). More recently, three sites dated to the Magdalenian (El Arco, Las Cabras, and Cueva de Jorge) have been identified in open air rock shelters in Almadenes Canyon, Cieza (Salmerón Juan et al. 1998). Although the latter is within the study area, the paintings are very different in style from the adjacent post-Palaeolithic paintings, and are clearly a distinct tradition (Montes Bernárdez and Salmerón Juan 1998:43, see figure 3.1b). Naturalistic upper Palaeolithic styles (Almadenes) may have lasted until the microlaminar Epipalaeolithic (Martí Oliver and Hernández Pérez 1988:39). Excavations at Los Grajos II (Walker 1972), while suffering from some problems with the stratigraphy (Montes Bernárdez and Salmerón Juan 1998:37-38), have revealed materials in at least two separate occupation levels (although Walker originally described four levels, a later re-study by Fortea revised this to two levels). As reported in Montes Bernárdez and Salmerón Juan, the lower levels were aceramic, with a lithic industry that has been described as belonging to the Late Magdalenian, while the upper levels were identified as Epipalaeolithic by Walker. While the Palaeolithic images are not included in the analysis here, at Las Cabras there seems to be a Schematic style anthropomorph, together with some unidentifiable remnants, in one of the rock shelters (Salmerón Juan et al. 1998:98). This reinforces the suggestion that the location retained a special significance over time.

3.1.2 Mesolithic or Epipalaeolithic

The Mesolithic is defined more by its chronological position between the end of the Pleistocene and the start of large-scale farming than by marked cultural shifts. Although there is a general trend toward microlithic technology the overall pattern of hunting and gathering does not change dramatically. Hence this period is often called *Epipalaeolithic* as it is a continuation of Palaeolithic traditions, although the development of microlithic technology suggests a flexibility in both tool manufacture and upkeep and the types of resources that were exploited, in a new environment and climactic regime brought on by warming and increased forestation in the Holocene. Because of this relatively non-specific nature, it is difficult to positively identify the differences between this time period and the Neolithic, which in turn has an impact on the understanding of the advent of rock art in this region, especially the Levantine style.

Sites in the Jumilla area with an Epipalaeolithic component include Cueva del Monje I, which has an occupation sequence beginning in the Epipalaeolithic and lasting until modern times (a 19th century jug was found in this cave; Región de Murcia Digital 2004); Cueva de los Zagales, Fuente de la Zarza, and Collado Norte de Santa Ana. In Mula, Epipalaeolithic remains have been found in Cueva del Buho (Epipalaeolithic lithics in a cave occupation, Martínez Andreu 1981, 1983), Cueva del Berro (indeterminate remains, Epipalaeolithic to modern), Totana (Pedanía district), Huerto de Corazón de Jesús, and Santa Leocadia (a settlement). Further afield, in the Lorca area, sites include Barranco de la Hoz I, Loma de Mora I (an apparent lithic workshop), and Torralba VI.

Although Zilhão dismisses the "trickle" model of Neolithic emergence (2001:14180-1), there is some evidence of concurrent occupation or substantial contact across the Mediterranean during the late Epipalaeolithic and early Neolithic. Some of this suggests interaction between technologically Mesolithic peoples and incoming Neolithic farmers over a long period of time, implying to some researchers that the transition between them was gradual (Cruz Berrocal and Vicent García 2007; Fairén Jiménez 2007). Ceramics at Catena in Tarragona (Layer A) were dated to 6607-7040 cal BC. This layer, which appeared to have little indication that the ceramics were intrusive, also contained lithic types and fauna which are more consistent with the Epipalaeolithic, but is earlier than the accepted date of ceramic introduction of ca. 5400 cal BC (Angelucci 2003:597). Cova Fosca produced Epicardial ceramics and domestic ovicaprids in levels dated to ca. 7600 BC (Bernabeu Aubán et al. 2001*a*:600, see also Moure Romanillo and Fernández-Miranda 1977; Olária 1988). Verdelpino yielded plain wares, usually associated with the Late Neolithic, in a level dated to ca. 7950 BC and had no evidence of any domesticates (Bernabeu Aubán et al. 2001*a*:600, see also Moure Romanillo and Fernández-Miranda 1977; Olária 1988). Gazel and Dourgne in France appear to have evidence of domesticated ovicaprids at ca. 7800 BP and 6800 BP (see Geddes 1980; Guilaine et al. 1993, cited in (Bernabeu Aubán et al. 2001*a*:599)), respectively; but these dates are anomalous and may be products of post-depositional mixing, rather than genuine assemblages (Zilhão 1993).

Several other sources of evidence suggest that these associations are not correct. Tools at cardial sites are quite different from other Epipalaeolithic sites, except for those at Cocina, which has a very long Epipalaeolithic sequence and could possibly indicate interaction between groups (Zilhão 2000). No occupation of the interior is apparent between 11,400 years ago and 5000-4500 BC when sites with epi-cardial ceramics and evidence of fully developed agricultural economies appear (Zilhão 2000:144). No evidence for two populations is apparent after the beginning of the Neolithic (5600/5500 cal. BC, after Bernabeu Aubán and Díez Castillo 2002), while Epipalaeolithic sites, such as Cueva del Búho in Mula, do not seem to be occupied at this time (San Nicolás del Toro 2005:212).

3.1.3 Neolithic

There are two broad hypotheses regarding the origin of the Neolithic in eastern Spain, and the advent of agriculture in western Europe generally. The migrationist view is that people and goods, including domesticates, moved into the area from elsewhere, displacing the native population. In contrast to this, the indigenist position is that the local people selectively adopted new cultural practices and technology from distant neighbours, gradually becoming agro-pastoralists in the process. There are several variations on these models, including the "wave of advance" (Ammerman and Biagi 2003; Ammerman and Cavalli-Sforza 1979), the "island filter" (Vicent García 1997; Zilhão 1997, 2001), and the "dual" or "trickle" models (Cruz Berrocal and Vicent García 2007; Fairén Jiménez and Guilabert Mas 2002-2003). The evidence for either model of Neolithization leaves a somewhat confused picture, with credible evidence to support either position. The main points of this debate are presented below, together with a discussion of the Neolithic archaeological remains found at the rock art sites in the study area.

The Neolithic period has been dated in the area from the early VI millennium BC (Bernabeu Aubán et al. 2001*a*:598), marked by the appearance of cardial wares in the second half of the VI millennium in sites such as Cova de l'Or, dated to 5460-5230 cal BC. Ceramics with this type of decoration, which is created by pressing the shells of the *Cardium edulis* (a marine mollusc) into the clay before it is fired, are largely associated with coastal sites, and more rarely in interior areas (Bernabeu Aubán 1999:102). The distribution of cardial ceramics makes this area part of the widespread Mediterranean impressed ware group, which includes Mediterranean areas of southern France, Spain, and Portugal. Impressed wares can be broadly summarized as a series of decoration techniques, which define different chronological phases. The main sequence is based on Cendres Cave, in Alicante (Bernabeu Aubán 1989; Bernabeu Aubán et al. 2001*b*; Bernabeu Aubán 1999:102). The ceramic phases and date ranges can be summarized as follows:

- Cardial (6800-6300 BP): Impressed cardial shell decoration found on up to 75-90% of decorated pots

- Early epicardial (ca 6300-5800 BP): Incised and impressed decoration becomes more common, and sometimes mixed on same vessel

- Late epicardial (Andalusia and interior, 5800-5000 BP): Rare decorations within the epicaridal tradition

- Post-impreso (5800-5000 BP): "only present in those coastal regions where the cardial phase was important" (Bernabeu Aubán 1999:102); new techniques (such as carving) tend to appear and incised/impressed diminish in importance

The earliest evidence of domesticated plants in Spain to date was recovered in the 1960s, from "silo" deposits at the sites of Cova de les Cendres and Cova de l'Or in Alicante. Several species of domesticates were found together, implying that different grains were grown concurrently. The effort involved in growing several crops at once suggests to some researchers that by the early Neolithic, relatively large scale cultivation was the basis of the economy on the eastern coast of Spain (Peña Chocarro 1999:3). Palaeoenvironment studies (Ribé et al. 1997:65-66) suggest signs of agricultural food production circa 5-4 millennia BC, based on analysis of pollen, charcoal, and sediments. Domesticated plant remains from Cova de les Cendres dated in the range from 5590±140 BC to 4210±120 BC (Peña Chocarro 1999:2-3).

Several radiocarbon dates from the southern Iberian Peninsula have quite short time differences between them, which Zilhão interprets as evidence for the migrationist model, which suggests a period of only a few hundred years for the spread of the "total package" of Neolithic characteristics around the Mediterranean. Ceramic typologies (Zilhão 2001; see also Bernabeu Aubán 1989) show a rapid regionalization of those styles, which may be an indication of the expansion and consolidation of new agricultural practices and settlements in the beginning of the Neolithic (Ribé et al. 1997:67).

The indigenist view is that different items of Neolithic technology were not necessarily introduced at the same time or by migrating farmers; rather, they were spread through diffusion and trade and selectively adopted by indigenous hunter-gatherer groups. If this is the case, the elements of the "Neolithic package" will not always be found together and may appear in different stratigraphic layers (Bernabeu Aubán et al. 2001*a*:598; see also Lewthwaite 1986; Pallarés et al. 1997; Vicent García 1997). If this is the case, the elements of the "Neolithic package" will not always be found together and may appear in different stratigraphic layers.

Both migrationist and indigenist models expect that Neolithic hallmarks, such as ceramics and domesticated crops, should appear first in the east and spread westward as people, knowledge and goods, or both moved into the Iberian Peninsula. According to the taphonomic study undertaken by Bernabeu et al. (2001*a*), a higher number of fractures versus canid tooth marks in faunal assemblages in pre-Neolithic (that is, aceramic) contexts indicates that humans were extracting marrow from the bones of hunted animals. In Neolithic contexts, the situation is reversed, suggesting that bone marrow was no longer important as a human food source and was instead given to dogs, which are unknown before the Neolithic (Bernabeu Aubán et al. 2001*a*:601). This also raises the possibility that fats in the diet were acquired from some other source, possibly dairy products derived from domesticated animals. This pattern also provides a means to assess the integrity of deposits in archaeological sites, as the frequency of tooth marks and fractures are expected to correlate with ceramic or aceramic levels, respectively (Bernabeu Aubán et al. 2001*a*:601).

The Neolithic era is the best-represented period of use at La Serreta, evidenced by ceramics, lithics, and the manufacture of stone bracelets (Martínez Sánchez 1994). Surface finds of ceramics at Enredaderas suggest some use of the site in the Neolithic and Eneolithic periods (Montes Bernárdez and Salmerón Juan 1998:44). Several fragments of incised and impressed ceramics, similar to those found in the Neolithic levels at La Serreta, were found in El Paso shelter II (Salmerón Juan et al. 2000:694-696). Surface finds of Neolithic and Eneolithic date were apparently noted at El Laberinto (Montes Bernárdez and Salmerón Juan 1998:45), although this is not mentioned in the discussion in Salmerón Juan et al. (2000:698-699). A Neolithic ceramic sherd, described as being similar to those found in El Paso, was found on the surface of Los Rumíes, although it is not stated whether this sherd was incised or impressed (Salmerón Juan et al. 2000:698).

A thermoluminescence date on a ceramic sample from the upper level (as identified by Fortea) at Los Grajos II was 6,000 $\pm$ 500 BC, while a radiocarbon date on a fragment of deer bone from the same level was dated at 5,250 $\pm$ 160 BC. Unfortunately there was not enough deer bone recovered from the lower level to obtain a satisfactory date (Montes Bernárdez and Salmerón Juan 1998:37-38). Excavations in Los Grajos III revealed two levels of material remains, as described by Montes Bernárdez and Salmerón Juan (1998:40). The uppermost was a collective burial of Eneolithic date, with at least seven individuals, as well as 26 flint arrow points, eight necklaces with a total of 313 beads made of marine shells, seven bone rods, and a bone awl. Below this was found the apparent remains of a Neolithic occupation, as evidenced by several fragments of undecorated ceramics and lithics; Montes Bernárdez and Salmerón Juan suggest that this level is associated with the paintings, although this opinion does not seem to be based on the stratigraphy of the shelter. Milano shelter II, excavated in 1986 (San Nicolás del Toro 2009:11), contained a megalithic stone wall enclosing a multiple burial, including lithics, beads, and other artefacts, dating to approximately 5950 cal BP (San Nicolás del Toro 2009:13). Alonso has identified some remnants of paint on the wall above the burial (San Nicolás del Toro 2009:120), but these are too faded due to exposure to identify.

The three Peña Rubia sites, together with El Milano and Los Grajos III, are unusual in that they are some of the few sites where rock art can be directly associated with archaeological remains. The unusual character of the rock art panels located mainly in the dark zone inside the small caves and the stylistic differences with other naturalistic or Levantine style images in general (they may actually be better considered as Semi- or Sub-Naturalistic in style, Montes Bernárdez and Salmerón Juan 1998:58) reinforces an impression that they were created within a short time span that can be related to the excavated materials. Unfortunately all three sites have been disturbed by looting (Mateo Saura 1999:154); however, archaeological materials which seem to be associated with burials of Eneolithic date were found in all three caves (Mateo Saura 1999:160; Montes Bernárdez and Salmerón Juan 1998:58). As reported by Mateo Saura (1999:160), the lithic materials include stemmed and leaf-shaped flint projectile points, triangular and trapezoidal flakes, an unworked flint nodule, and a polished stone axe (at Las Palomas). Bone objects including beads, an amulet, and animal phalanges which appear to show some signs of carving were also recovered. Ceramics included cord-impressed ware, a sherd with incised parallel lines and a herringbone pattern, and a painted fragment with a "sun" motif on the inside.

Excavations at El Pozo have revealed levels of Epipalaeolithic through Bronze Age and Ibero-Roman date. A well-preserved section of floor dating to the Neolithic is located approximately 1.5m below panel 2 in Shelter III (see figure 3.2). From this height the Schematic style images panel 2, and possibly the adjacent panel 4, would have been at approximately eye level from the perspective of a person standing inside the shelter. This combination may lend support to the dating of the Schematic style images as Neolithic, and echoes a point made by Alonso Tejada and Grimal (1996) about the height of the paintings at Cueva de la Cocina.

Models of the Neolithic transition

Sites in Mediterranean France and Spain (Pallarés et al. 1997) have Epicardial style ceramics earlier than expected by migrationist models, and in many cases these appear to have been present before Cardial style ceramics, which are associated with the advent of the Neolithic in the migrationist view (Bernabeu Aubán et al. 2001*a*:598). The occurrence of ceramics and domesticated plants and animals, and the associated radiocarbon dates, is quite varied across the Mediterranean area (see table 1 Bernabeu Aubán et al. 2001*a*:600). Polished stone tools and ceramics are found in otherwise technologically Epipalaeolithic or Mesolithic levels at several sites in Valencia and Aragón (Ribé et al. 1997:67). Excavations at the Catena site in Tarragona (Angelucci 2003:597) provide further support for the existence of co-occurring human populations. Excavation Layer A contained ceramics in a context

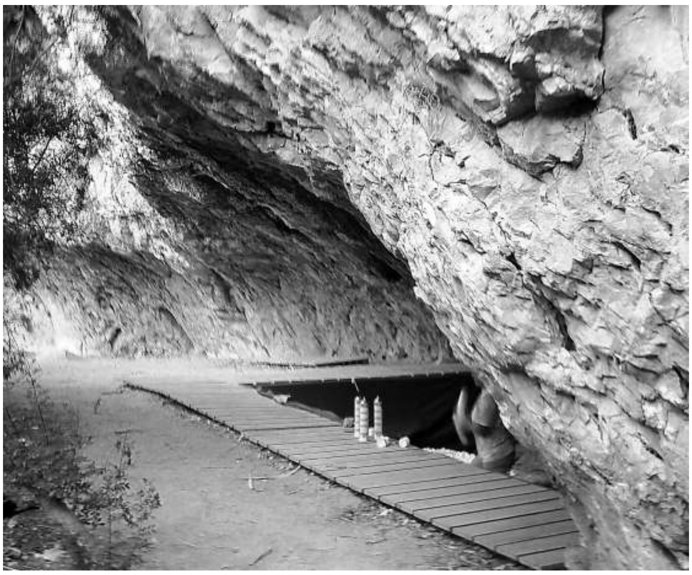


Figure 3.2: Excavation at El Pozo, shelter III. The person is standing on a preserved Neolithic floor, just below the Schematic motifs on panel 2. Photograph by the author.

otherwise consistent with hunter-gatherers, as determined by lithic types and fauna, dated at 6607-7040 cal BC, or much earlier than the accepted date of ceramic introduction of ca. 5400 cal BC. It is possible that the charcoal used in dating this layer was in fact older, reworked material; however, the layer was sealed in antiquity by a roof fall and appears to have had very little disturbance since it was laid down, suggesting that the ceramics are not intrusive (Angelucci 2003:597). In Andalusia, the caves of Nerja and Dehesilla have Early Neolithic layers with ceramics and domesticated animals. However, the ceramics are not Cardial style, and the evidence for domesticated plants is uncertain. At Dehesilla, the lower layers contain backed bladelets, associated with the Mesolithic or Epipalaeolithic elsewhere in the Mediterranean, despite the lack of a recognized pre-ceramic occupation (Bernabeu Aubán et al. 2001*a*:599; see also Zilhão 1993).

A similar situation has been reported at other sites in western Andalusia (Pellicer Catalán and Acosta 1982, cited in Zilhão 2001). Further to the north, the sites of Fosca and Verdelpino have similar dates (7600 and 7950, respectively) but while Fosca revealed both Epicardial ceramics and domestic ovicaprids, Verdelpino contained only plain wares, usually associated with the Late Neolithic, and had no evidence of any domesticates (Bernabeu Aubán et al. 2001*a*:600, see also Moure Romanillo and Fernández-Miranda 1977; Oläria 1988). The sites of Gazel and Dourgne in France (see Geddes 1980; Guilaine et al. 1993, cited in Bernabeu Aubán et al. 2001*a*) are different still, with domesticated ovicaprids at 7800 BP and 6800 BP, respectively. However, the earlier date for Gazel is anomalous, and is much earlier than the date predicted by either model (Bernabeu Aubán et al. 2001*a*:599). These and similar dates have been critiqued as products of post-depositional mixing, rather than genuine assemblages (Zilhão 1993). If this is the case, then the indigenist model is less plausible.

The "dual model" (Bernabeu Aubán 1999, 2002; Fortea Pérez 1973) suggests concurrent processes of independent invention of "Neolithic" characteristics by the indigenous Epipalaeolithic groups, together with selective adoption of material culture introduced by Neolithic populations arriving from the eastern Mediterranean, including, perhaps, Macroschematic art. The existing Mesolithic hunter-gatherer population then developed the Levantine style as a response to ideological and cultural conflict, according to this model. When the last of the Mesolithic population had disappeared, through acculturation or extinction, the resulting group developed the Schematic style (Fortea and Aura Tortosa 1987; cited in Fairén Jiménez 2007). According to the dual or "trickle" model, local people, as intelligent and opportunistic hunter-gatherers, selectively (and reversibly) adopted useful items of material culture and ideas about production through existing trade networks and interchange throughout the Mediterranean (Cruz Berrocal 2005*b*:44; Fairén Jiménez 2007:139-140). The dual model has been critiqued as unsupported by the evidence (Fairén Jiménez and Guilabert Mas 2002-2003) because it is not consistent with the rock art sequence indicated by decorated ceramics and superimpositions of different rock art styles.

It has even been suggested that the model is based on a scientific "mythology" that must have a savage (Epipalaeolithic) *other* against which to define the civilized (Neolithic) *us* (Hernando Gonzalo 1999). This problem is an old one in archaeology; however, it is becoming clear that in some places there are complex and long term interactions between groups of people and different economies across the western Mediterranean (Harrison and Orozco Köhler 2001; McClure et al. 2008:326-327; Pluciennik 2008:26).

There are a number of problems with the radiocarbon dates. Technical limitations and preservation issues have skewed the data toward cave sites, rather than open air settlements, and may have introduced errors due to mixing of materials of different ages (Bernabeu Aubán et al. 2001*a*:598). The dates obtained from early excavations were from bulk samples, which have been shown to include materials from different levels, or which were possibly mixed with reworked older organic material (Zilhão 2001:14180-1) or other residual items.

Migrationist models are predicated on the hypothesis that Neolithic material culture was brought into the Iberian Peninsula by a new human population moving in, bringing the full "Neolithic package" with them. It is clear that at least some aspects of the Neolithic economy must have come from elsewhere, chiefly because there are no known native antecedents to the domesticates (Jansen et al. 2002; Peña Chocarro 1999;

Ribé et al. 1997; Zapata et al. 2004; Zilhão 2001). This model is logically consistent with the notion that agricultural practices and crops gradually spread from their place of origin in the Near East through the Mediterranean to Spain, possibly via the Balearic Islands, and then from coastal areas into the central and northern parts of the Peninsula. As a result, the expectation is that the Neolithic technoeconomic complex will appear as a distinct assemblage at particular sites (Bernabeu Aubán et al. 2001*a*:598, see also Bernabeu Aubán 1996; Zilhão 1993, 1998, 2001).

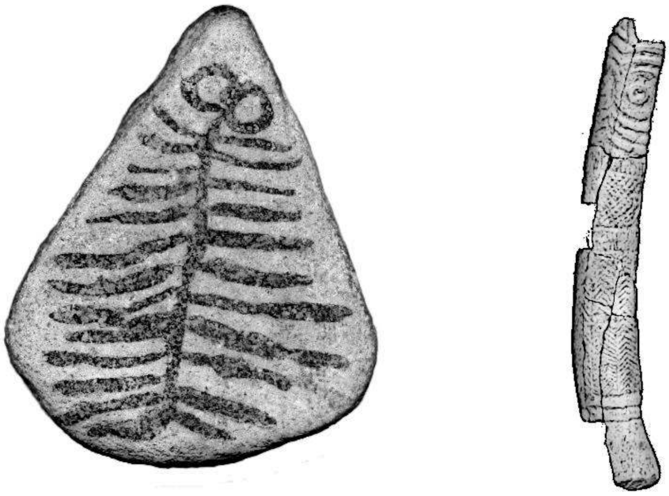
The results of Bernabeu's taphonomic study indicate that the appearance of a gradual transition in three of the most important caves yielding evidence of domestication, namely Nerja, Cendres, and Cocina, is actually a palimpsest of materials from several occupations, which does not in reality record a gradual transition (Bernabeu Aubán et al. 2001*a*:601). A combination of tree clearing, digging storage pits into earlier levels in loose sediments, and increased rainfall served to increase the likelihood of post-depositional mixing (Bernabeu Aubán et al. 2001*a*:601).Further, the very nature of Neolithic economic activities resulted in greater geomorphological change in the landscape, as processes such as tilling soil, digging storage pits, and building construction alter fundamental properties of the land including vegetation cover and patterns of erosion and deposition (Bernabeu Aubán et al. 2001*a*:602). Accelerator Mass Spectrometry (AMS) radiocarbon dates on short-lived samples (seeds, bones) from Cardial Neolithic levels across the Western Mediterranean are very close in time (Zilhão 2001:14180-1).

If the evidence for a gradual transition is, in fact, a spurious impression based on these depositional palimpsets, then the migrationist viewpoint seems more strongly supported than the indigenist view. However, it is possible that there were multiple changes and ways in which this transition occurred. For example, patterns of land use in the Polop Alto valley of Alicante demonstrate a long history of occupation and little change in the early Neolithic. Twenty kilometres to the east, in the Río Penáguila valley, there was a much more dramatic change in land use at this time, and much less evidence of earlier occupation (Bernabeu Aubán et al. 2001*a*:609). These two patterns seem to suggest gradual adoption versus colonization, respectively, although it is not actually possible to distinguish populations based on the materials recovered, because of their generic nature (Bernabeu Aubán et al. 2001*a*:609).

3.1.4 Copper Age (Chalcolithic

The Copper Age (Chalcolithic or Eneolithic) is dated to 3000-2250 BC in the Vera basin (Castro et al. 2000:150); similar dates apply elsewhere in this region of the Iberian Peninsula, however. In the Late Neolithic and Copper Age, a very different society and land use system seems to have prevailed (Chapman 1990; Díaz-Andreu 2002). Both the "social storage" caves and the large site with concentric ditches at Mas D'Is (Bernabeu Aubán et al. 2003) seem to have been abandoned after the middle Neolithic; at the same time, the Macroschematic style of painting appears to cease (Fairén Jiménez 2004*b*:9; (2007:138)). This seems to be related to the need to maintain social cohesion during times of economic, social, and ideological change (Fairén Jiménez 2004*b*:9). Trends of increasingly stratified society with a concern for water and land control together with signs of conflict, such as the large fortified sites like Los Millares, continue into the Bronze Age (Argaric, 2250-1550 BC in the Vera basin, Castro et al. 2000:150).

The "ocular idol", ramiform, and star-like motifs in the rock art at Enredaderas (Salmeron Juán and Teruel 1990:143) are similar to motifs found on ceramics and carved bone objects associated with the Chalcolithic (such as those illustrated in del Rincón 2002:314), although surface finds attest to a Neolithic and Eneolithic presence. The small "idol" figure, consisting of a phi-like figure with three horizontal lines on top, branching out on either side, which is described in Salmerón Juan et al. (2000:698-699; figure 6.27) is again quite similar to the carved bone objects. The ramiform motifs at Los Cuchillos echo the "eyed idol" motif often found in ceramics and bone artefacts, particularly a bone plaque excavated from a burial at Glorieta de San Vicente in Lorca, which suggests a Chalcolithic chronology (figure 3.3). However, the phi-like motif is much more widespread in both time and the range of artefacts in which it is found, which could imply a longer chronology for the site of Los Cuchillos (Díaz-Andreu et al. forthcoming *b*:10).



(a) Painted plaque, Glorieta de San Vicente

(b) Bone "eyed" idol, Los Royos

Figure 3.3: Parallels between the rock art at Los Cuchillos and portable artefacts include this painted plaque (Díaz-Andreu et al. forthcoming *b*), which was excavated from a Chalcolithic burial at Glorieta de San Vicente in Lorca, and the well-known carved bone "eyed" idols, such as this one from Los Royos in Caravaca. Digital drawings by the author, based on photographs from the Museo Arqueológica Municipál de Lorca.

3.2 Rock art chronology and interpretations

Naturalistic upper Palaeolithic styles (like those in Almadenes) appear to have lasted until the microlaminar Epipalaeolithic, as evidenced in part by the lack of a figurative tradition during the later geometric Epipalaeolithic (Martí Oliver and Hernández Pérez 1988:39); rather, this era is associated with the Linear-geometric style (corroborated by parallels to the incised plaquettes from Cendres). Macroschematic style paintings appear in the early Neolithic, as evidenced by the parallels with early Cardial ceramics, and represent a new socio-economic milieu. Levantine style paintings are found superimposed over the Macroschematic, representing the development of a new artistic horizon; however, the wide distribution of the Levantine compared to the very restricted Macroschematic reinforces the notion that the beginning of the Neolithic does not occur at precisely the same time in all areas, although it is always before the end of the fifth millennium BC in south-central

Valencia (Martí Oliver and Hernández Pérez 1988:39). The separation in time between the Levantine and Palaeolithic styles suggests the former does not have roots in the latter, but the Macroschematic could have influenced the Levantine (Martí Oliver and Hernández Pérez 1988:39).

Several lines of evidence suggest that post-Palaeolithic rock art began with the Neolithic. The Macroschematic has been associated with earliest Neolithic (cardial) ceramics, based on formal similarities with the rock art motifs (Martí Oliver and Hernández Pérez 1988:94). Stone bracelets, dated to the Neolithic and similar to those seen in both Levantine and Semi-Naturalistic style paintings, were found in several stages of completion at La Serreta, implying the presence of a specialized workshop although no specific area within the cave was identified as such (Martínez Sánchez 1994:54). Direct dating of oxalate crusts over some Levantine motifs at the site at Tío Modesto resulted in dates of 5230-5010 cal BC and 4800-4160 cal BC (Ruiz et al. 2006).

No organic binders were noted in a Raman microscopy and IR spectroscopy study of Schematic style figures from Los Muricélagos cave (Zuheros, Córdoba), and it was not possible to identify the source of the haematite used to create the red pigments (Hernanz et al. 2006). The sample size was too small to be used for AMS radiocarbon dating, and it was determined that taking a larger sample would be too damaging to the paintings. This lack of organic binders limits the possible application of direct dating, unfortunately.

The understanding of the chronology of post-Palaeolithic art in Eastern Spain changed significantly with the recognition, in 1988, that the rock art could be associated with the Cardial ceramics (Martí Oliver and Hernández Pérez 1988). The primary evidence for this is the sequence of superimpositions, where they occur. The similarity between Macroschematic images and anthropomorphic motifs on early Neolithic Cardial style ceramics, such as those from the sites of Cova de l'Or and Cova de la Sarsa (see figure 3.4), is the key to current chronological understandings of the post-Palaeolithic rock art as a whole (Hernández Pérez et al. 1988, 1994; Hernández Pérez and Martí Oliver 2000-2001; Martí Oliver and Hernández Pérez 1988). In this work Bernat Martí and Mauro Hernández proposed that the advent of rock art in the Neolithic was closely related to the nascent productive economy, which remained fairly mobile and retained a dependence on the exploitation of all resources, not simply agricultural products, a pattern present since the start of the Holocene.

The Macroschematic in Alicante seems to have only been made for a short time in the early Neolithic (Neolithic IA, 5460–5230 cal BC) (Fairén Jiménez 2004*b*:5). If the early Neolithic date of the Macroschematic is accepted, then the superimposition of Levantine style motifs over Macroschematic anthropomorphs, such as that noted at La Sarga, is understood to be the earliest demonstrable date for the Levantine style (Fairén Jiménez 2004*b*:5). In Alicante, this suggests that the Levantine style appears to begin just after the early Neolithic (5460–5230 cal BC). Similarities between the Levantine motifs have only been recognized in later post-impressed ceramics (although this association has been disputed; see Alonso Tejada 1999:79-82).

The anthropomorphic Cardial ceramic motifs generally have bodies consisting of wide bars or vertical parallel lines, raised arms, and defined fingers and sometimes feet. The figures are often surrounded by groups of vertical lines which are sometimes wavy or zigzag, similar to the Macroschematic motifs at Pla de Petracos in particular. One sherd is said to have horns similar to the "Brujo" figure at La Sarga (Martí Oliver and Hernández Pérez 1988:27), although this motif is quite different from the other Macroschematic figures, as it is not surrounded by lines, does not have defined fingers, has arms down rather than up, and seems to have defined ribs in the interior of its body. Other parallels between the rock art and the ceramics include the general use of wavy lines, often with "fingers" similar to Barranc de Benialí, and rayed circles (which evoke the "eyed idols" found in rock art and various classes of mobiliary art aside from ceramics, notably carved bone idols). The two fragments which are said to represent horns have two small lines pointing up from a triangular head and short lines sticking out from the side of the body and arms, respectively.

The second ceramic motif (which somewhat resembles a cactus; Martí Oliver and Hernández Pérez 1988:60) is much more similar to the Pla de Petracos figure (shelter 5, panel 1) in that it has these lines and the upraised arms. However there is also a striking parallel to the "shaman" figure at La Serreta, at least in terms of the perpendicular lines which

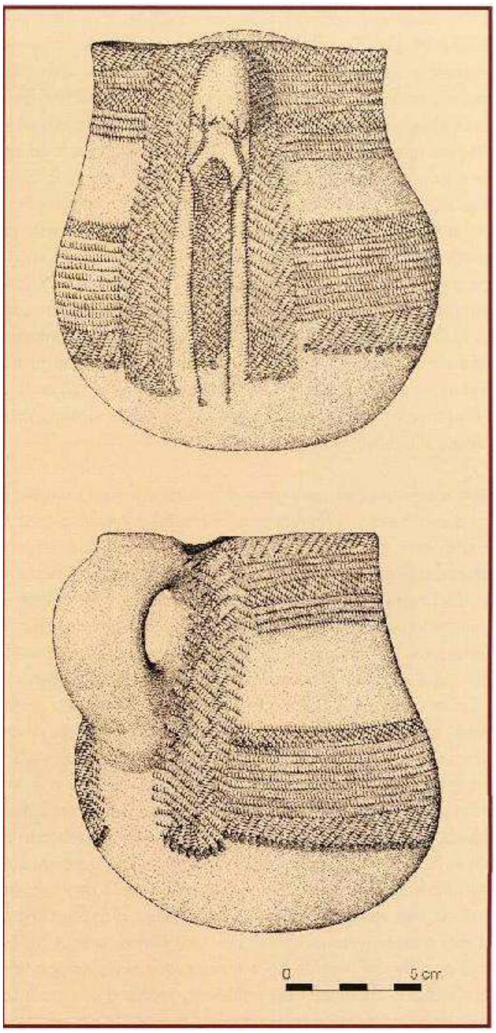


Figure 3.4: Sketch of cardial style ceramics from Cova de l'Or (Hernández Pérez and Segura Martí 2002:149).

surround the figure (though of course not the arms). Another parallel can be drawn between the wavy lines and some ambiguous motifs at Mediodía and La Serreta (compare plates 75,77, or 78 in particular, Martí Oliver and Hernández Pérez 1988).

The Schematic in Alicante appears to begin in the early Neolithic (Neolithic IA, 5460–5230 cal BC) as well; however, this style was made for a longer period, as evidenced by the variety of motif types depicted. Early in the sequence motif types including humans, animals, and radial geometric figures are considered to be typical, while the later sequence is associated with motifs associated with the Chalcolithic (Bell Beaker period, 4360–3950 cal BC and 3360–2470 cal BC), especially the "ocular" idols (Fairén Jiménez 2004*b*:5). The Schematic and Macroschematic are said to have similar motifs, particularly the X or Y shaped stick-figure anthropomorphs and zigzag lines, although the Schematic style motifs are much smaller (Fairén Jiménez 2004*b*:5). Although Schematic and Macroschematic motifs are considered to be similar, particularly the zigzags and X or Y anthropomorphs, the Schematic figures are much smaller and tend to be distributed around the Macroschematic images, but rarely superimposed on them. This has been suggested to indicate that the Schematic motifs were "an ideological reinforcement" of the Macroschematic (Fairén Jiménez 2004*b*:5). This possible underlining of the message conveyed by the Macroschematic motifs is perhaps an example of the deliberate use of rock art imagery to establish a link with an older message, and also indicates the continued importance of particular locations over time.

Zoomorphs appear on four fragments of cardial ceramics, and are considered to represent a parallel to Levantine art (Martí Oliver and Hernández Pérez 1988:36). Two appear to be from the same typical cardial vessel, one with a partial caprid and the other with a partial cervid and an animal with a long tail which is interpreted as a bovid (Martí Oliver and Hernández Pérez 1988:69).

Some researchers feel that the predominance of hunting themes in both Levantine and Schematic style rock art and the proximity of Epipalaeolithic sites to rock art locations suggests a hunter-gatherer economy and therefore a Mesolithic or Epipalaeolithic date (Alonso Tejada and Grimal 2002*a*; Utrilla and Calvo 2002; Various Authors 1999). However, the arrows depicted in the Levantine style images appear to be an artefact associated with third millennium BC sites, and is taken as evidence of the development of this style over a long period of time by other researchers (Fairén Jiménez 2004*b*:5). Alonso (1999:79) disputes the link between Levantine motifs and the ceramics on the basis that the manner in which the horns of the caprids and antlers of the cervids shows a lack of concern for the naturalistic depiction of the relative differences in width which would be found in a naturalistic depiction, which is also noted in the shape of the bovid motif. The construction of the lines which make up the motifs on the ceramics does not seem intended to convey these naturalistic details, even if the technological limitations of manner in which the ceramic motifs were created is taken into account. The rock art motifs are generally composed of more fluid or curvilinear lines and broad strokes, versus the ceramic motifs which are often angular and composed of multiple parallel lines of impressions from the cardium shell. Martí and Hernández explain this formal difference as the result of the different mediums and techniques used to create the motifs, but consider them to be otherwise similar (1988:27). On the other hand, this depiction of horns and antlers with simple lines is clearly seen in the Schematic style motifs.

Similarities between Schematic style motifs and ceramics support a long sequence of development for this style. Parallels with early Cardial ceramics suggest that the style emerged during the early Neolithic period, while parallels with the so-called "idol" figures on post-Cardial ceramics and other artefacts imply that the style continued until the Copper Age at least, and some motifs may even persist until the Iron Age or later (Fairén Jiménez 2004*b*:3-4). Additionally, images on some late Neolithic post-Cardial style incised pottery sherds from Cova de l'Or are considered to be similar to both Levantine style zoomorphs and Schematic style anthropomorphs (Fairén Jiménez 2004*b*:5), which together with the depiction of characteristic Neolithic artefacts such as arrows, bracelets, and esparto grass baskets, strengthens the association with third millennium BC and later sites (Fairén Jiménez 2002*b*). Comparison to ceramic sequences from Valencia and Castellón, including an incised fragment with an apparent bird head from Cova Fosca, suggests that Levantine style art in this area also began in the late fifth millennium BC (Martí Oliver and Hernández Pérez 1988:39). In any case, there seems to be an agreement that the rock art styles continue beyond the Neolithic, particularly into the Chalcolithic (e.g. Jordá Cerdá 1985). This implies that the post-Palaeolithic styles are roughly contemporary (Martí Oliver and Hernández Pérez 1988), and were made for different purposes by the same social group (Fairén Jiménez 2007).

As Cruz Berrocal (2004*a*) suggests, the most parsimonious inference given the lack of direct dating evidence is that the rock art begins in the Neolithic, without a clear end date. It is possible that the ceramics and the rock art were not made at the same time, even though they contain similar imagery (Cruz Berrocal 2005*b*:121). However, without new evidence this cannot be fully evaluated. If the sequence in Alicante (Fairén Jiménez 2004*b*:5) gives an indication of the chronological variation in other areas, however, it suggests that the styles were only contemporary for part of the sequence. Both the Schematic and the Levantine styles seem to have had a long period of development, coinciding with other cultural changes which affected the relationship between people and the landscape. This is especially visible as the Chalcolithic developed, and new motifs were introduced in both the ceramics and the rock art, especially the Schematic style; however, stresses including possible depopulation in the western Mediterranean in the Mesolithic period (see, for example, Biagi and Spataro 2002; Holtby et al. in press) raises the possibility that there may have been significant population changes and stresses occurring across the wider region before archaeologically detectable evidence of those changes appears.

While the chronological sequence of the rock art is disputed, and may not be uniformly applicable across the entire distribution of post-Palaeolithic rock art, the best information which is currently available supports the notion that the styles are largely contemporary. The internal chronological differences within each style, such as the sequence identified by Domingo in Valltorta (2004), also support the proposition that the styles were continuously developed over a considerable period of time. The re-use of sites and frequent over-painting of some motifs also indicates that certain sites retained a common ceremonial significance which is partly expressed through different contemporary styles.

3.2.1 Implications of chronology

Despite the ongoing debate about agricultural origins, it should be remembered that the presence of agriculture does not necessarily exclude features normally associated with hunter-gatherers. The importance of agriculture in Neolithic society as a whole is sometimes assumed on the basis of identified domesticated resources. However, mixed sedentary farming is not necessarily demonstrated by reference to the other evidence, such as the presence of small quantities of seeds, which assumes a predominance of agriculture but does not take into account continuing mobility and foraging after experiments with agriculture (Bradley 1997:6; see also Flannery 1976). Indeed, many features of Neolithic sites around Europe are "different with a capital D" when compared to modern or historical examples (Chippindale 2001*b*:73), suggesting that the actual behaviour of people during this time was not, in fact, very similar to the more recent peasant farmers and herders which are often used as a model (Halstead 2002). This also suggests that equating a given style with a particular set of values, traditions, and rituals or ceremonies may be obscuring the variability which may reveal how this change occurred.

Although the Neolithic period in Mediterranean Spain is characterized by the introduction of new technologies, general population mobility seems to have remained important throughout this time (Fairén Jiménez forthcoming:13, Fairén Jiménez 2007:137, San Nicolás del Toro 2005; see also Halstead 2002). It is essential to an agro-pastoral economy in a dry environment that flocks or herds of animals have access to new areas of pasture and water sources, an economic pattern which persists to the present day. There is also some evidence of seasonal distribution of goods (Fairén Jiménez 2004*b*:9, see also Vicent García 1997). Such movement and use of multiple environmental zones and seasonal resources may be linked to the differences between the styles in this area, perhaps reflecting different specialized agricultural or pastoral activities (Fairén Jiménez forthcoming:13; see also Halstead 2002). Similar transhumance is linked in other regions to strong patterns of rock art distribution, in that different themes or types of motif are shown in distinct regions (for example, Loendorf 2004:215).

Neolithic sites seem to have different spatial and functional characteristics, in that open-air sites near optimal agricultural lands seem to be preferred, with caves and shelters along the valleys appearing to be used as short-term shelter for hunting or pastoral activities. This intermittent occupation of the caves and rock shelters distributed around the rock art sites suggests that they formed a network of places of varying importance distributed around the main settlements, in a logistical resource system (Fairén Jiménez 2007:137), like that identified by Binford (1980). The number of open air sites in use increases throughout the Neolithic, while the number of caves in use remains stable. By the late

Neolithic only those caves used for storage or pastoral shelter seem to be in use, which may be related to the progressive intensification of agro-pastoral "secondary products revolution" (Fairén Jiménez 2004*b*:5; see also Sherratt 1981).

Open air sites appear to have been relocated frequently, as they are found within about 1.5 hours' walk apart (and within an hours' walk of the entire catchment area) and therefore would not have been in use at the same time, as their concurrent use would deplete resources (Fairén Jiménez 2004*b*:6). This relocation may have been a response to poor agricultural soils in the region (Fairén Jiménez 2002*a*). The similarity of a number of open air and cave sites at the beginning of the Neolithic sequence is consistent with the progressive adoption of farming, as agriculture combined with other practices gradually became more important, perhaps as a result of the "secondary products revolution" (Sherratt 1981).

The images have been attributed to the Epipalaeolithic or Mesolithic, based on the style and interpretation of the items and actions depicted in the images themselves (see, for instance, Aparicio Pérez and Morote Barberá 1999; Ripoll Perelló 1997, 2001; Various Authors 1999). Some features of Levantine art are similar to hunter-gatherer art worldwide, suggesting that the images must not have been created by farmers. However, current chronological understandings seem to place it within the Neolithic. A further complication is that the overlapping distribution of both styles implies that the imagery was not made by two competing ethnic groups, rather, that the differences in style were due to different functions but made by a single group. Many images ascribed to the Levantine style (as well as some which have been categorized as Semi- or Sub-Naturalistic) appear to portray hunting scenes, and in many ways the style overall is very similar in appearance and apparent thematic content to rock art traditions which are known to be associated with hunter-gatherer populations, for example, South Africa, western North America, and Australia. However, if the connection between early Neolithic ceramics and the emergence of rock art, and the subsequent dating of the images based on superimposition is correct, then the post-Palaeolithic rock art must be associated with at least some degree of agriculture. The overlapping distribution of the rock art, and the lack of distinct archaeological territories, implies that the same cultural group produced both Levantine style images, with their prevalent hunting imagery, and the ceramics, which are associated with a sedentary agro-pastoral lifestyle.

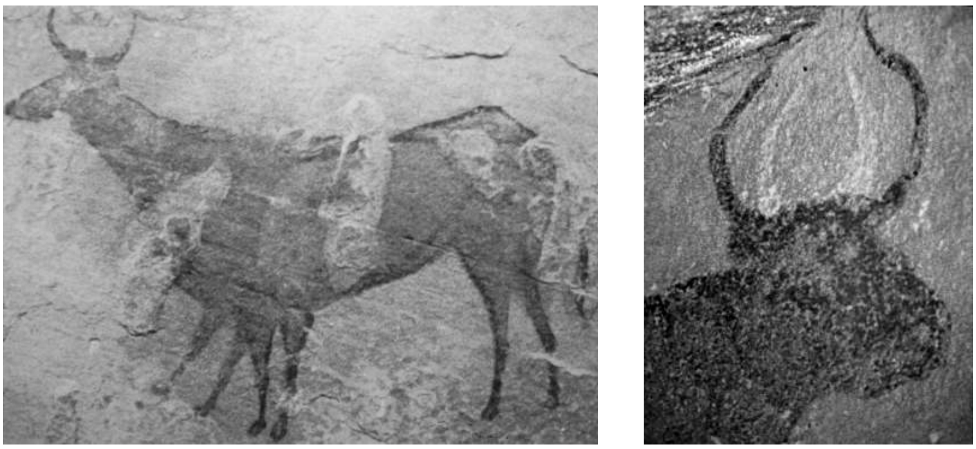
Gamble (1991) suggests that need for information has varied over time, subject to changes in ecology and settlement. Barton et al. (1994) extend this observation with the presumption that hunter-gatherer art is often used to identify landmarks and territories, linked to population increase. Lower-density groups with flexible compositions can more readily rely on oral traditions, but increasing populations and social group sizes encourage greater use of physical marking of landmarks and territorial claims (Bradley 1997:13). Hunter-gatherer (or other mobile) populations have a greater need to communicate their claims to territory and resources in order to ensure the mutual good of all, which may be reflected in rock art. If this is the case, the systematic consideration of the content of the images, in view of the assumption that they were a means of such communication between groups, suggests the nature of the audience by virtue of its location and complexity (Bradley 1997:9). Bradley notes that "the essential feature would be that rock art provided one means by which different parties, who were not present on the same occasions, could communicate with one another (1997:13)". If the rock art styles are in fact contemporary, as argued above, then the coexistence of distinct styles may represent the specialization of pastoral and agricultural roles, and their use of different locations (Fairén Jiménez forthcoming:13, see also Halstead 2002).

3.2.2 Superimposition and repainting

There are several examples of over-painting and superimposition in post-Palaeolithic rock art, which aside from providing chronological information suggest a deliberate placement with respect to existing images on these panels. In the Alicante area, Fairén demonstrated that while Schematic and Macroschematic style motifs are often found together, the former is not usually superimposed on the latter. The relationship between Schematic and Macroschematic images does not seem to be a factor of the available space on the panel nor a means of obscuring or destroying older images (Fairén Jiménez 2004*b*:7; 2007:132).

Levantine style motifs, however, have been found superimposed on motifs of both styles. Not all panels contain superimposed motifs, and the placement of motifs in those which do suggests that there is a deliberate association between motifs. Fairén suggests that this complex pattern of superimposition may be a deliberate link to the power of older images (Fairén Jiménez 2007:132). This over-painting indicates that particular images were revised and restored "in order to preserve and prolong the value -- whatever its nature -- attributed to the primitive figure" (Beltrán Martínez 1982:57). Such deliberate links to the power of older images have also been noted in South African San practices (Lewis-Williams 2002). In cases such as Canto Blanco (Jumilla), Prado de las Olivanas (Tormón) or Ceja de Piezarrodilla (Albarracín), there seems to have been a deliberate over-painting which changed the nature and identity of the motifs (see figure 3.5).

Prado de las Olivanas appears to show a deer later changed into a bull, according to Beltrán's description. The animal does not have the hunched withers often portrayed in other bull figures in post-Palaeolithic rock art, but seems to have had a tail, lunate horns, and an extra set of forelegs added. Ceja de Piezarrodilla has a black bull with an extra set of



(a) Prado de las Olivanas **(b)** Ceja de Piezarrodilla

Figure 3.5: Details of repainted bulls, from Beltrán Martínez 1982 (unnumbered appendix pages 5-6). Figure a seems to be a deer which was transformed into a bull through the addition of lunate horns and a long tail, in addition to an extra set of legs. Figure b appears to have originally been a white bull, later repainted in black.

horns, painted in white, and according to Beltrán the entire figure was repainted, the black paint identical to the underlying white, with the exception of the horns (figure 3.5, Beltrán Martínez 1982: unnumbered appendix, pages 5-6). The right side of the panel at Gargantones seems to contain a Levantine style caprid superimposed by the large phi-like figure and one of the linear motifs (Alonso Tejada and Grimal 2006*b*:49). Due to the poor preservation it is difficult to see this detail; however, the differences in colour are apparent (see figure 6.13). Los Grajos I exhibits several instances of repainting and superimpositioning, including a figure which seems to have been changed from a female to a male (motif 20, figure 6.33). These instances of superimposition may reflect a deliberate use of the imagery to communicate particular messages associated with the motif types.

Superimposition in the study area

Few motifs have been repainted or are involved in superimpositions, making it difficult to relate the motif types or styles in this way. The order of superimpositioning is not always clear from either published descriptions or field observations. At Buen Aire I, two pairs of pairs of rectilinear lines (motif number 11) appear to be painted over the zoomorph motif number 10, one set over the rump area and the other over the head. These lines may be remnants of another zoomorph. Peliciego motif number 5, a possible remnant of an anthropomorph (Alonso) may be superimposed by zoomorph number 4, a possible equid. On panel 1, El Milano, the cervid motif number 10 appears to be superimposed by number 9, an additional cervid, as well as motif number 11, an amorphous area. Number 9 in turn appears to be superimposed by number 8, an anthropomorph.

On Los Grajos I panel 1, there are several examples of superimposition. Motif number 14, a very large partial female anthropomorph, appears to be underneath motif number 10, a normal-size female anthropomorph. Both motifs appear to be wearing long skirts. The indeterminate gender anthropomorph number 27 appears to be underneath the boar-like zoomorph number 26. Both motifs appear to have striped bodies, and the anthropomorph is one of very few round-bodied types. Motif number 20 is a female anthropomorph with a long skirt which has either been partially repainted or is superimposed by an indeterminate gender stick figure anthropomorph.

Several motifs appear to have been repainted, or possibly superimposed by amorphous remnants. These include the female anthropomorphs, numbers 21 and 23, on Los Grajos panel 1. A further female anthropomorph, number 8 on Milano panel 1, also appears to have been repainted or superimposed, as does the male anthropomorph number 28 on Pico de la Tienda I, panel 2. The motif at Canto Blanco is difficult to interpret, although it has certainly been repainted several times. The most recognizable portion of this image is a zoomorph, apparently either a cervid or caprid. However, there may also be an anthropomorph either under or over this image; additionally, it appears that a head with either horns or antlers has been painted on both ends of the body of the main figure.

In cases of superimposition, Macroschematic style art has only been found underlying Levantine and Schematic motifs, and are always in a central position in panels with more than one style (Fairén Jiménez 2004*b*:4-5; Martí Oliver and Hernández Pérez 1988). Levantine motifs are only found over Macroschematic motifs in Alcoy, but are sometimes interspersed with Schematic motifs elsewhere (for instance, at Gargantones, see figure 6.13, Alonso Tejada and Grimal 2005*a*:49). Schematic style images are never found superimposed on Macroschematic motifs, although they often appear on the same panels (Fairén Jiménez 2004*b*). Levantine images are found superimposed on both Macroschematic and Schematic images, and are in turn sometimes superimposed by Schematic images. Assuming that the Macroschematic style can be linked to cardial ceramics and thus began at the same time as the Neolithic emerged, this superimposition implies that the Levantine and Schematic styles began later than the earliest Neolithic. However, parallels with both Levantine and Schematic style motifs and images on other ceramic fragments, especially animal figures, suggest that all three rock art traditions are roughly contemporary with the ceramics and thus emerged quite soon after the initial Neolithic.

The next chapter explores some ideas about the ways in which people use rock art to express ideas about the world and the supernatural, and how these ideas are manifested in the landscape. While rock art cannot be said to represent all of the ritual and religious activity that occurred in a given society, it has the advantage of being found in more or less the same place that it was originally created, and with the same arrangement and sequence of creation, meaning that rock art is less vulnerable to the kinds of taphonomic processes that can distort other archaeological evidence. This quality may allow us to determine some of the features of both the rock art itself and the overall site location which held meaning or reflected aspects of an ancient world view, although our ability to interpret the meaning, rather than identifying the meaningful, is limited in the case of post-Palaeolithic rock art due to a lack of a direct ethnographic or historical connection.

Chapter 4

Landscape and world view

Several recent studies have examined various aspects of the landscape in relation to post-Palaeolithic rock art, including: rock shelter size, elevation, and orientation; least-cost path analysis, association with other cultural features including historic drove routes and settlement distribution, image style and motif, and relationship to outstanding geophysical features (Cruz Berrocal 2004*a*,*b*, 2005*a*,*b*; Cruz Berrocal et al. 1999; Fairén Jiménez 2002*a*,*b*, 2004*a*,*b*,*c*; Fairén Jiménez and Guilabert Mas 2002-2003; Torregrosa 2000-2001; Torregrosa and Galiana Botella 2001; Zapata et al. 2004). The results have demonstrated that the relationship between location and rock art is indeed significant, generally indicating that the meaning or importance of the concepts represented by rock art motifs may have been tempered by the appearance of the motifs with other types of image or their location in particular geographic contexts. The methods of grouping the images to facilitate their study do not take into account details such as the apparent gender of anthropomorphs or the species of animals portrayed, however. Further, separating the images into styles before considering the iconographic content does not address the potential common meaning of motifs across styles, and may obscure some commonalities which are important in understanding the use of particular places. This chapter reviews the results of recent work in Mediterranean Spain, and discusses the proposition that the location and content of rock art sites is related to world view and the deliberate use of imagery.

4.1 Patterns of distribution in post-Palaeolithic rock art

The physical characteristics of decorated rock shelters (such as size and access) vary together with aspects of the images themselves (Fairén Jiménez 2004*a*,*c*). Visibility of both rock art sites and the surrounding landscape is often of significance. In Alcoy, rock shelters were classified into five distinct types, based on size, location, and the occurrence of rock-art styles in them (Fairén Jiménez 2004*a*,*b*,Fairén Jiménez 2007:133-134). Fairén took similar values into account in her overview study of Murcia (Fairén Jiménez forthcoming), which can be considered as a standard set in landscape studies of rock art: absolute and relative altitude, shelter orientation, degree of slope and corresponding difficulty of access, distance to water, distance to drove roads in the case of Spain, and distance to other archaeological sites (Neolithic, in this case). Other important variables in Fairén's overview study of Murcia include: topography (slope and prominence) and therefore visibility and accessibility; and the distance-based viewsheds between sites (less than 1km, 1-5km, more than 10km). The starting points for these analyses were known Neolithic sites in the area, the calculated catchment area for each, and soil types, compared between open air and cave sites in order to understand both variable functions of site types and patterns of movement between sites (Fairén Jiménez 2004*b*:5). The values for each site show clear differences that may be related to variability in size, morphology, and style (that is, they are regularly patterned).

The complexity and type of different types of rockshelter (defined as a combination of accessibility, least cost paths to settlements, and style of imagery) seems to be related to geographic location in the Alcoy region. Fairén identified five types of painted rock shelters in the Alcoy region of Alicante, corresponding to distinct patterns of stylistic and geographic distribution (Fairén Jiménez 2002*a*, 2004*a*,*b*,*c*; see table 4.1). The relationship between these types of rock shelter and other aspects of the archaeological record, especially burials and settlement catchment areas, were interpreted to suggest that each shelter type was associated with different economic, ritual, and social functions or activities. Schematic style art is found in all types of rock shelter. Macroschematic style rock

Table 4.1: Summary of rock shelter types in Alicante (after Fairén Jiménez 2004*b*:7-8).

Shelter type	Size	Topography	Styles	Complexity	Other notes
1	Small	High places with good visibility	Schematic	Simple	Away from settlements, near burials
2	Large	Major valleys	Multiple (incl. Macro-schematic)	Complex	Frequent re-use. Visibility seems unimportant. Large gatherings?
3	Variable	Side canyons leading into major valleys	Multiple, but only one style on each site	Variable	Valleys and passes, possibly related to resource control?
4	Large	Massifs or ranges between valleys, difficult to access	Schematic	Complexity	Sometimes near water sources (e.g. springs)
5	Variable	Near mountain passes, with wide viewsheds	Levantine and Schematic	?	Later chronology, possible response to resource pressures?

art is only found in types 2 and 3, and Levantine in 2, 3, and 5. This distinction between the different types of rock shelters has chronological implications. In stage 1, the Macroschematic and Schematic art was created in some type 3 shelters in the side canyons, but mostly the open, public, type 2 shelters with evidence of re-use. In stage 2, these are still in use for Schematic and Levantine, but type 3, type 5 (near mountain passes), and type 1 (isolated, near burials) become more numerous. This, in addition to the disappearance of the Macroschematic style, signals "an important shift in the effect sought with the production and consumption of rock art -- a change that can be correlated to those affecting the social and economic circumstances of these communities (Fairén Jiménez 2007:135)". As Fairen acknowledges, however, these types are only strictly applicable to Alcoy.

In Murcia, painted shelters generally fell at an absolute altitude between 680-1020 meters and especially 1020-1360 meters above sea level. Few of the painted shelters are in prominent locations; those that are have wide viewsheds and are isolated from the surrounding areas. There are no Levantine paintings below 340 meters above sea level, yet 20% of Schematic figures are found at this level. Twenty-five percent of Levantine figures are found between 340-680 meters above sea level, while Schematic figures are sparse (Fairén Jiménez forthcoming:11). Relative altitude, however, is much more important in an environment of strong topographic contrasts. The most variability was noted in the Schematic distribution, with 22% at 60-30 meters below the surrounding area versus 2% of the Levantine images; and 13% more than 30 meters above the surrounding area versus 7% of the Levantine. Levantine sites tend to be located in areas which are less removed from the surroundings (Fairén Jiménez forthcoming:11). The distribution of rock art also does not appear to be related to movement along valleys, unlike Galicia or other Iberian Peninsula regions (Bradley et al. 1995; Martínez García 1998). Fairén interprets the rock art sites as destinations in their own right rather than markers along a journey from one place to another as a result (Fairén Jiménez 2007:135-136).

Recently it has also been suggested that the rock art sites are an essential part of the developing agro-pastoral economy (Fairén Jiménez 2006, 2007). The locations of rock art sites relative to these mountain corridors was interpreted as an indication of their importance in daily life, especially economic practices, and how often they were used. Some sites are located close to the axes of movement, but most are not. Most viewsheds are quite restricted, there does not seem to be any pattern of inter-visibility, and many of the shelters used are quite small and do not stand out from their unmarked neighbours. Links between site location and communication imply control of land use (including route-ways, settlement patterns, and foraging territories) through symbolic means. Proximity and ease of access to open-air sites, resources such as water, and historic (possibly ancient) drove routes (but see Halstead 2002; Walker 1983) have all been taken as evidence of this association. Slope (access) was important (Fairén Jiménez forthcoming). Slope in this instance really only indicates that the accessibility of the shelters is generally somewhat difficult; this could be a geological accident rather than an intentional selection.

The relationship of rock art to landscape in Fairén's study area of Alcoy was studied using Geographic Information System (GIS) cost-surface analysis, a technique to model least-cost-paths, or the least difficult ways of moving between defined points in the landscape (Fairén Jiménez 2004*b*:8). In this case the least-cost paths were calculated between settlements and rock art sites. These calculations together predict the easiest or most practical means of moving from one defined point to another, using a particular set of assumptions (such as walking speed, following the calculations in Gorenflo and Gale 1990) and landscape variables (Fairén Jiménez 2004*b*:5). The results indicate how accessible a given site was, and from this its likely importance in daily life can be inferred.

Based on the comparison of the location of rock art sites with cultural landscape features (storage, burial, and domestic sites) and geographic features (including the least-cost paths from domestic to rock art sites, catchment areas, rock shelter sizes, and rock art panel complexity), it appears that while rock art seems to be connected to economic changes, there is no straightforward relationship between the apparent activities depicted and the locations or economic activities themselves. That is, pictures of apparent hunters do not necessarily occur in locations where hunting conditions would be favourable.

The apparent overlap of open-air site catchment areas in Alicante has been interpreted as "showing constant relocations of the same group, probably due to the limitations on [SIC] the long term of the agricultural system of production and the poor soils in this mountainous area. Thus, the inhabitants of this area would have to move on frequently, although showing at the same time an early attempt to get fixed to the territory (Fairén Jiménez 2004*b*:6-7)." Proximity to Neolithic settlements seems important, as Levantine sites tended to be somewhat further away from Neolithic settlement or occupation sites, generally being located within two or three hours' walk, while Schematic sites tend to be within one hours' walk (Fairén Jiménez forthcoming:10-12). When viewed as a whole, however, the majority of both Schematic and Levantine sites are found within three hours of a known Neolithic site (Fairén Jiménez forthcoming:12), indicating that both styles are normally located within the catchment areas of Neolithic sites (see also Fairén Jiménez 2004*a*,*b*,*c*). However, at this distance, the distinction between the catchment areas of either style seems trivial, and reinforces the impression of overlapping distribution of the rock art styles.

Distance to water and route ways, however, demonstrates that rock-art is found in settings which have practical advantages for the activities of both herders and hunters, in that they are often located near water sources and other resources which are attractive to ungulate animals of the type depicted in the rock-art, as well as the domesticated species which are diagnostic of the Neolithic. The rock art sites seem to be located near features (water and drove routes) which are important for an agro-pastoral economy, thereby lending support to the hypothesis that both styles were created in the context of a developing Neolithic agro-pastoral economy (Fairén Jiménez forthcoming). Both Levantine and Schematic sites tended to be found in slopes of 15-40 percent, within 15 minutes' walk of a water source, and within 15-45 minutes' walk (Fairén Jiménez forthcoming:10) of a *via pecuaria* or drove route.

There is some difference in the association with drove routes (*vías pecuarias*), in that 40% of Levantine sites are situated less than 15 minutes from a route versus 25% of Schematic sites. However, most of the rock art sites (79.1% and 78%, respectively) are located within 45 minutes walking time of such a route, indicating a certain convergence between the rock art and routes used by herders (Fairén Jiménez forthcoming:10). The convergence of rock art site locations and the drove routes was interpreted as an indication that the economic concerns underlying the placement of styles were related to the mid- or long-distance movement of animals (Fairén Jiménez forthcoming:10). However, in my opinion it is possible that such routes tend to be in drainages or passes where the movement of water has created rock shelters in the first place, and where water collects and is accessible to animals and people; it may be an accident of geography that the two locations converge, rather than a diagnostic feature of economic concerns.

For comparison, Cruz Berrocal (2004*a*:57) shows the near-total convergence of rock art sites and the historic drove roads in the Valltorta and Gasulla areas. Based on the map presented, however, it is also clear that these roads generally follow the natural topography, skirting drainages and other areas of lower relief which create passes through the mountainous terrain. Although it is clear that the historic drove routes tend to be located in relatively close proximity to these areas of lower relief, it is equally clear that many of the rock art sites are located on higher ground; further, although the entire area is shown cris-crossed with such drove routes, the rock art sites are localized in two clusters. This suggests that the connection between route ways and rock art sites, in terms of distance, is not a straightforward support for the notion that the rock art sites were used in the course of ordinary herding activities. Cruz (2004*a*) suggests that the placement of imagery in the landscape of

La Valltorta and Gasulla in the Maestrazgo region is structured at the level of style, with a "complementary" distribution that marks boundaries between styles. Fairén found that the frequency of different styles found in different aspects of the landscape varied according to several criteria; however, the overall distribution of styles in the Alcoy area overlaps considerably, and multiple styles are often found on the same panel.

The mountain slopes are dotted with rock shelters and caves of varying sizes, yet only a few have rock art or other signs of prehistoric use. Those that do often do not seem readily distinguished from the surrounding landscape or associated with obvious landmarks, and in some instances they seem to be hidden in side-canyons, rather than main valleys. This is consistent with Fairén's observations in Alicante that while rock art is often found in natural corridors, it does not appear to be associated in a predominantly visual way -- either in terms of viewshed or inter-visibility (Fairén Jiménez 2004*b*,*c*, 2007). Images located in shelters with low visibility may not have been meant to be visible at all, and their messages were not directed toward other people. Together these findings imply that the kinds of images found in different places is related to other aspects of life at the time, such as changing patterns of land use as the new economic system developed (including negotiation and conflict over resources and moving around when those resources were exhausted), ritual life, especially funerary rites (in Alicante). The results of various studies suggest that the different styles and motifs were important in communicating social and ritual messages within a single cultural group, connected to and perhaps determined by the locations in which the images are found. Similarly, Torregrosa found an association with notable "landmark" aspects of the geographic context in which rock art is found. Diaz-Andreu found a correlation between the colour of the rock on which imagery is found as well as the relative accessibility and "ritual depth" of these locations (Díaz-Andreu 2002).

A further consideration is that post-Palaeolithic rock art sites are not uniformly distributed within the area in which Schematic and Levantine style distributions overlap. The pattern of distribution cannot be explained by the presence or absence of suitable shelters or location within a mountainous area, for while most post-Palaeolithic rock art is found in the mountains not all such areas have rock art, and not all of the shelters have been used (Díaz-Andreu 2002:163-164). The lack of paintings in apparently suitable locations indicates that each site was deliberately chosen and identified as a place; however, the variability in the physical (and potentially cultural) characteristics of rock art sites suggests that there was no single motivation for this selection (Díaz-Andreu 2002:164). The concept of ritual depth (Díaz-Andreu 2002), or the "uneven balance between secularity/sacredness of each locale in the landscape" (Díaz-Andreu 2003:48), may be useful in interpreting the differential distribution of motif types both in the recognition of the types which are more likely to be found together and in what places.

The distinction between motifs found in hidden or difficult to access sites versus visible and easily accessible sites, while invoking ritual concepts which are commonly understood across the culture, nonetheless suggests that there is a difference in both purpose and audience which may be related to relative "sacredness" of the activities which took place in each site, especially if it can be related to other elements of material culture. Thus a site such as La Serreta, for example, contains both fairly typical motifs which seem to evoke a hunting scene, yet in a rather unusual geographic context in a hidden, difficult-to-access site which also contains a unique motif and evidence of the manufacture of stone bracelets, the latter of which may even be linked to trade in similar items across the Mediterranean (Harrison and Orozco Köhler 2001).

The Schematic style images are more varied in their placement than the Levantine images in terms of relative altitude, access, and distance to features such as water and *vías pecuarias* (traditional routes used by herders), although they overlap too much to consider them as the product of distinct groups (Fairén Jiménez forthcoming). Although it has been suggested that variability in the distribution of style and figure types in Murcia, especially the triangular headdress, is an indication that the Moratalla sites were the core territory of a clan-like system (Mateo Saura 2004), other research does not support this. Such a development of territorial groups could well be an aspect of this increasing ceremonialism; however, the images themselves do not seem to follow expected patterns of visibility for territorial markers normally associated with a clan-based social structure (Fairén Jiménez 2006:261).

According to Fairén, territoriality as a result of conflict in the early Neolithic between hunter gatherers and incoming farmers does not seem to be supported by the site distribution, because: 1) this would require visibility, which the sites lack; 2) they are not distributed around the edge of a territory; 3) the rock art styles have complementary distributions and frequently occur together, therefore establishing links between the imagery over time; 4) this coexistence indicates symbolic continuity, rather than confrontation; and 5) the differences in style are the product of different social roles and changing economic needs, rather than distinct populations (Fairén Jiménez 2007). This suggests that the same group of people made both styles, and that each style was made for different purposes. Distinct distributions might be expected if there were two groups of people living in the area, with radically different world views and economic systems. The fact that the location of the rock art styles is not exclusively related to the necessities of either an agricultural or a hunter-gatherer economy is contrary to the proposition that either style can be attributed to a distinct group of people, in accordance with different economic needs (Fairén Jiménez forthcoming:12). By the same token, this lack of distinction between the distribution of Schematic and Levantine hampers efforts to gain a more detailed understanding of what those purposes may have been.

4.2 World view and the distribution of rock art

The main argument is the extent to which the changes seen in the Neolithic derived from the movement of people, versus the movement of ideas. Generally speaking, the tendency to use similar design elements in multiple contexts and media across the distribution of post-Palaeolithic rock art does reinforce both the idea that there is a ritual continuity or a similar meaning behind many of the characteristics of the motifs, and that the rock art is broadly connected with the ceramics and hence with the Neolithic sequence. It is possible that if broad stylistic differences do indicate distinct chronologies (Epipalaeolithic versus Neolithic, in other words), the appearance of a similar kind of image in a similar context might indicate some kind of ritual continuity over time.

It has been documented in other parts of the world that rock art appears to retain at least some meaningful features, even if the wider cultural context changes, sometimes dramatically. For example, the Dinwoody tradition of Wyoming appears to have had a long development history, and may have been made over a period of several thousand years (Loendorf 2004:204, see also Francis and Ronald 1993 and Francis and Loendorf 2002), which would have spanned several important cultural changes. Some features of the later rock art, such as a horse and rider motif made in the Dinwoody style, were found in the topographic position observed for similar four-legged "ground people" across the entire body of Dinwoody images (Loendorf 2004:215). This suggests that at least some aspects of the world view associated with the Dinwoody style, particularly the division of physical space which suggested a particular correspondence between certain kinds of images and kinds of places, continued well into historic times.

The Macroschematic style seems to be a short-lived phenomenon, due to its limited distribution and characteristic location underneath the other styles in instances of superimposition. In contrast, the Levantine and Schematic styles are probably long-term traditions, produced continuously throughout the prehistoric period. This is supported through the similarities identified between some naturalistic motifs, the parallels with other types of artefact which themselves have a long development sequence spanning several centuries, the obvious re-use and re-painting of some rock art sites, as well as the variety of pigments and states of preservation. Together these characteristics suggest that we should expect to observe some changes within each style over time, although the overall tradition may remain similar. This is important to recognize, because this variation is obscured within a group of images defined as a single style. Understanding these changes and the associated use of the landscape as the Neolithic developed requires a more detailed level of analysis. Regardless of whether the styles are contemporary, they are often found together or in close proximity, and their overall distribution overlaps substantially. This suggests that there was a persistent importance assigned to some places, and the thematic similarities between the styles implies that the types of images or themes portrayed also retained significance over time.

The continued religious significance of these sites over time has long been recognized, as evidenced by their relative isolation in the landscape as well as the tendency to re-use certain sites (Beltrán Martínez 1982:56). Concurrent use of different sizes and styles has been linked to different cultural themes in ethnographic sources (Sauvet et al. 2009:321), and traditions with long histories often reflect persistent associations between the landscape and the rock art (see, for example, Loendorf 2004), which can indicate the cosmological, and perhaps functional, use and importance of that place over time. The continuity of importance over time, and the distinctions between site categories, may not be evident in style itself. By defining types which transcend style, we can observe patterns in the combinations of design elements which are not captured by style alone. The longevity of rock art styles, and the continued re-use of certain sites over time, suggest that certain sites or areas retained a ritual significance over time. If this is the case, then certain motifs may have a similar connotation regardless of the style or time in which it was produced. Although it may be possible that the Neolithic chronology is in error, and the two main styles are indeed the product of separate time periods or cultures; this re-use and concentration of images in small areas nonetheless implies that the locations remained significant even if it is impossible to determine the nature of that significance or the relationship between the groups who created the imagery. Generally speaking, this tendency to use similar design elements in multiple contexts and media across the distribution of post-Palaeolithic rock art does reinforce both the idea that there is a ritual continuity or a similar meaning behind many of the characteristics of the motifs, and that the rock art is broadly connected with the ceramics and hence with the Neolithic sequence.

There is evidence that both the Levantine and Schematic traditions have a long history of development, even while remaining quite similar over time, and in some locations a sequence of development can be seen even within a single overall "style" (see Domingo’s sequence in Valltorta, and Hernández/Fairen’s sequence in Alicante). Altogether these observations and findings show that post-Palaeolithic rock art as a whole is quite variable and multi-dimensional, and within each "style" there is a great deal of variability with respect to the landscape context in which it occurs, the images which occur together, and the shape or form of the motifs themselves. However, to date all of these studies have begun their analysis by separating the images into their respective styles. If there are regular patterns in the kinds of images which are placed in particular contexts or places, it suggests that the significance of the type of image is linked to the location in which it is found.

Regardless of whether modern researchers are able to understand meaning (Layton 2000:179), there are a meaningful patterns in the kinds of images and the places where they are located. This type of pattern has been observed in other locations where it is possible to link these patterns to a known ethnographic tradition which gives a cosmological framework for understanding these patterns (for example, Australia and Dinwoody). While we cannot make connections of the same depth in the case of post-Palaeolithic rock art due to the lack of an ethnographic connection, such examples give reason to believe that similarly meaningful patterns exist in other bodies of rock art imagery. The location and content of rock art sites is a direct reflection of the world view of the creators of the imagery (Loendorf 2004). By examining the distribution of rock art at a relatively detailed level, we can arrive at an enhanced understanding of how beliefs are mapped on to the landscape. The choice of image type and the location in which they are found is a product of the world view of the people who created the images.

Rock art is but one aspect of the rituals which both express and sustain that view, and is not necessarily religious in nature, nor a reference to the supernatural. However, in that rock art is part of a wider system of ceremonial activities which embeds world view in the landscape, the examination of the types of motifs found in particular contexts can be used to derive an outline of the principles about the world which guided the selection of both motif and location. Layton suggests that we can be "alert to variation in style, distribution and preferred subjects which arise from the use of art in practical contexts which may once have enabled an authorized reading" (Layton 2000:179). The general principle is relevant here, because my aim is to identify possible ways in which specific sites, landscape contexts, and motifs may have been similarly distinguished. By examining the distribution of rock art motifs, it may be possible to identify patterns which were meaningful to prehistoric people, even if those meanings themselves cannot be identified (Layton 2000; Loendorf 2004).

While the current study is concerned with the expression of world view through rock art and landscape, it is also concerned with avoiding unfounded interpretations of the images. In other words, it is concerned with identifying the *meaningful*, rather than attempting to identify the *meaning*. Studies of rock art in other parts of the world provide a useful example of how a study of the distribution and frequency of motifs can be used to arrive at such an understanding. Layton argues that it is possible to arrive at an understanding of what aspects of a rock art tradition were important for an "authorized reading" (Eco 1990:53, cited in Layton 2000) of the distribution of motif types in the landscape, with reference to particular geographical characteristics of the sites in question. While it is not possible to fully understand that cosmology, due to the remoteness in time, we can identify some of the characteristic patterns, or perhaps behavioural cues (Hartley and Wolley Vawser 1998), in the rock art distribution which would have allowed a competent contemporary person to correctly interpret the images (Layton 2000:170-171). While the specific forms of ceremonial or economic practices cannot be fully known, we can recover an outline of what aspects of the land and the images themselves might have conveyed meaning. The choice of location and the kinds of images found conveys a great deal of information about the world view which led to the production of the rock art.

Cosmology, or world view, includes not only ideas about the supernatural or causality in the world, but also the appropriate social norms and structures which dictate behaviour. The cosmological principles expressed in rock art are not necessarily the whole picture or representative of the entire ritual or cultural sphere. The production of rock art is only one aspect of a whole host of behaviours or activities, ranging from customs such as dress and food preparation, to kinship systems, to architectural preferences, to supernatural or religious beliefs. Within this sphere of ritual, rock art is again only a small part of the whole range of activities, which would have included particular practices, such as ways of communicating supernatural claims between people as well as supernatural entities (such as prayers or meditation, group rituals or "services"), objects used in ceremonies, locations where rituals took place, rules concerning who could perform ceremonies, and means of determining when rituals took place.

Although the wider cosmology is expressed in rock art, in that rock art is a product of rituals which form a part of that cosmology, the body of rock art images does not necessarily refer to all aspects of cosmology, nor the views or roles of all members of society. Women and children are groups which are often left out of interpretations of rock art (Escoriza Mateu 2002); however, without the ability to truly verify which social groups, responsibilities, and roles existed within the culture which produced the images it is difficult to evaluate the extent to which marginalized or dissident groups are under-represented in rock art, or to verify the authorship of the images. The division of labour and specialization within the culture may also be reflected, as perhaps persons in charge of hunting would perform different rituals in different places than persons in charge of herding.

The approach taken in the present study is different from much recent work in Spain in that it considers the association between motif types, rather than broad styles, and the landscape. This approach was inspired by two studies by Layton (2000) and Loendorf (2004) in particular, as well as similar works involving the same authors (Loendorf 1989; Loendorf and Kuehn 1991; Sauvet et al. 2009). Both groups of work aim to understand how the placement of images in the landscape is related to an underlying world view or ritual practices, without necessarily interpreting the meaning of specific images. This study aims to apply a similar approach to the post-Palaeolithic rock art of northeastern Murcia. The most important theoretical themes to be addressed are the relationship between rock art and ritual, the notion of landscape, and the concept of style.

4.2.1 Scenes of shared culture: the concept of landscape

Landscape is important for two reasons: the growing recognition that people ascribe great significance to the land around them in spiritual or ritual terms, which can greatly influence their behaviour and activities in certain areas; and the fact that the landscape, as the place in which life is lived, is of fundamental importance to the economic developments which began in the early Neolithic. In recent years, the concept of landscape has gained increasing attention as an approach to the study of prehistory. As such, multiple definitions have been put forth, some with widely divergent understandings of both the relationship between the physical earth and the humans which live upon it as well as the limits of what it is possible to know about that relationship. At a minimum, *landscape* is simply the "backdrop against which archaeological remains are plotted (Knapp and Ashmore 1999:1)." However, the importance of the concept of landscape in archaeology has developed beyond this simple conception and now emphasizes the social and symbolic aspects of the places in which people live. Accordingly, landscape can be defined as the interaction between people and their physical surroundings (Bradley 1991). In archaeological terms, this is comprised of individual sites and the complexity of their embedded information, local site topography, and the wider distribution of sites.

The significance of any given aspect of that landscape is not necessarily indicated in a manner which can be observed archaeologically (Knapp and Ashmore 1999:1-2, Lance 1998). However, rock art is a particularly obvious manifestation of the conscious selection of a particular place and motif (that is, an in-situ manifestation of the articulation between the creator of the image and the environment, both cultural and natural; Fairén Jiménez 2005). This does not imply, however, that landscape is best understood as a mere container or context in which the interaction and negotiation which makes up social life takes place. In many traditional societies the land is considered to be an active agent in cultural processes and social matters, and is often viewed as a source of supernatural ideas and ceremonial practices. These supernatural powers of local landscapes can be a source of new understandings of the world and corresponding ritual practices for peoples moving into a new area. For example, the Mountain Spirits in Mescalero Apache tradition emerged after migration from Alaska and Canada to the Southwest, and the source of this tradition is explicitly understood as the supernatural powers of the local mountains themselves (Ball 2002:471). Culture emerges from interaction between multiple actors, including the landscape, in that "culture itself responds to the living spiritual powers of the land" (Ball 2002:468-469); the experience as well as the place is of fundamental importance in shaping belief and ritual practice, and the landscape itself is understood to play an active role in the development of culture and tradition (Deloria, in Ball 2002; see also Basso 1996; Knapp and Ashmore 1999).

Unfortunately, "landscape" sometimes seems to be synonymous with "geographical information system". Studies of this kind run the risk of overwhelming archaeological questions with sophisticated analysis techniques and maps which in the end do not add substantially to our understanding of the relationship between people and place (Gaffney et al. 1995).

This project is concerned with the relationship between people and landscape in two senses. First, landscape is understood to be a fundamental aspect of life and human perception of the world, akin to Ingold's "dwelling perspective" (1993). The landscape, in a more prosaic sense as the physical space in which people lived, and the relationship of people to it, is of fundamental importance to the economic developments which took place in the early Neolithic and beyond. The placement of rock art can be understood as a reflection of metaphorical ideas contained in the landscape which are fundamentally connected with how people understood and interacted with the world (Fleming's (2006) critique of phenomenology notwithstanding). The "scenes where shared culture emerges" (Ball 2002:468) might be taken literally to mean rock-art sites, as glimpses of particular moments in this ongoing interaction. Both the scenes depicted -- specific dances, hunts, ceremonies -- and the addition of new figures can be taken as elements of such a dialogue on a particular panel of rock art, as can the overall placement of the images relative to other aspects of life, as evidenced by the archaeological record. This dialogue, and the outcomes of the negotiations, conflicts, and performances that constitute life as it is lived are embedded within the physical landscape. The placement of images in particular locations also serves as a means of expressing and anchoring a world view, and acts as a mnemonic to remind and refresh important memories, much as stories and place names do (such as the Western Apache, Basso 1996). The places in which images are found can be understood as a reflection of the world view of the creators of the imagery. Although, as Layton cautions (2000:179), we cannot fully understand the meanings of the images, we *can* recognize some of the ways in which location held meaning for the makers (see, for example, Loendorf 2004). It can be argued that art (in the general sense of imagery), and the rituals which accompany its production, is a fundamental aspect of life in traditional societies and is seen as a functional entity, containing the power to effect change in the world through both supernatural actions and as a source of technological innovation and instruction (Boas 1955:157; Boyd 1998:27, citing the example of the Abelam of New Guinea; Irwin 1994:191; Sundstrom 2002:102-103; Walker 1999).

Examples of the correspondence between the distribution of rock art motifs and world view are found in several contexts around the world, although the specifics of those world views are not necessarily the same. The examples which will be mentioned here are the possible connection between rock art and shamanism or vision-seeking in Palaeolithic Europe, South Africa, and North America; changes in rock art traditions in southern Africa in response to social pressures, the identification of different ritual systems in Australia, and the linkage of recognizable elements of Shoshone cosmology with the Dinwoody petroglyphs of Wyoming. If the reasons for creating rock art are consistent across sites, and all local people share a common iconography, then the diversity of motifs is predicted to increase relative to the total number of motifs at a site (Kintigh 1989) in (Sauvet et al. 2009:330). This prediction was tested by examining the diversity of motifs in a given site, calculated as the proportion of the total range of motifs in a given region (or sample) compared to the percentage of number of types of motif at each site (Sauvet et al. 2009:330). In the art groups sampled for the study, it was possible to distinguish totemic art from traditions in which the same motifs are widespread in an area, but it was not possible to tease out alternative explanations for the pattern in the latter case (Sauvet et al. 2009:330). The analysis of type distribution in the petroglyphs of Dinwoody, Wyoming (Francis and Loendorf 2002; Loendorf 2004) indicated that certain motif types, or particular design elements, were preferentially located in particular landscape contexts. In this case, some images were grouped together because they represent similar concepts even though the overall motif type was different (such as humans which appeared to have talons were grouped with owl-like motifs). The motif types were then analysed according to their elevation (high, middle, and low) and the number and percentage of each type of motif within each band of elevation was calculated. On this basis, the striking preference for placing each type in a certain elevation was clear. Although the motifs were not always exclusively found in one band, especially those which were somewhat ambiguous (humans with three fingers, possibly representing talons, were associated with high elevations together with birds; "ground people" with other animals such as bison in the middle elevation), there was nonetheless a very striking difference. The existence of subtle details like defined fingers on certain anthropomorphs found in higher elevations, which suggests that they could in fact be classified as "sky people" rather than "ground people" (Loendorf 2004:207) is significant because it demonstrates that there are important details which can be obscured by an overly generic stylistic or even motif type classification, as well as demonstrating that certain details which carried meaning can transcend styles and motif types.

Because the Dinwoody images can be linked to the historic Shoshone, consultation of the ethnographic literature allowed this pattern of motif distribution to be linked to particular cosmological principles in Shoshonean mythology and religion. However, Loendorf stresses that while the ethnography was essential for making a positive link between the images and their specific meaning, understanding this meaning was not necessary to observe this pattern and make suggestions about its significance; rather, "the distribution of the petroglyphs and their formal design elements are more important variables... for deriving the world-view model" (Loendorf 2004:214). The results of the study also demonstrate that the examination of limited variables can nonetheless yield a significant result. Importantly, the pattern could have been recognized without ethnographic information, even if the meanings behind it could not be identified.

Other research at the Piñon Canyon Maneuver Site in southern Colorado suggested that the frequent occurrence of multiple zoomorph species, representing animals with different natural habitats and behaviours, on a single panel could be linked to ethnographic and mythological accounts of "sacred homes" of animal spirits (Wintcher 2004, 2005). As described in the ethnography and mythology of Caddoan-speaking Native American groups which were probably related to the prehistoric inhabitants of the region, these sacred homes were often located within rock and ground surfaces. Stories about encounters with these spirits often invoked themes of danger and misfortune. Another frequent feature of these panels is the occurrence of a single anthropomorph, sometimes with unusual details such as elaborate head shapes and splayed fingers, and associated with wavy lines (figure 4.1).

Two related studies (Layton 2000; Sauvet et al. 2009) examining the distribution of rock art motifs and the links to the underlying world view, in the form of different ritual systems, are also of interest. In both cases the aim was to demonstrate that the concept of shamanism is not necessarily the best explanation for some features of Upper Palaeolithic rock art by comparison to other archaeological cases thought to be associated with different world views, especially totemism and the production of non-religious rock art. Particular attention was paid to the distribution of animal motifs as they are the least ambiguous class of motifs (compared to anthropomorphs and abstract motifs) and are very frequent in the Upper Palaeolithic sample (Sauvet et al. 2009:321). The premise of both studies is that rock art associated with a totemic system will have a high number of different species of animals but each will be found at a small number of sites, corresponding to clan emblems used by a restricted group of people, sometimes exclusively, to demarcate a territory. By contrast, motifs are used in a shamanistic system to refer to concepts which are common across groups, suggesting that a reduced set of motifs

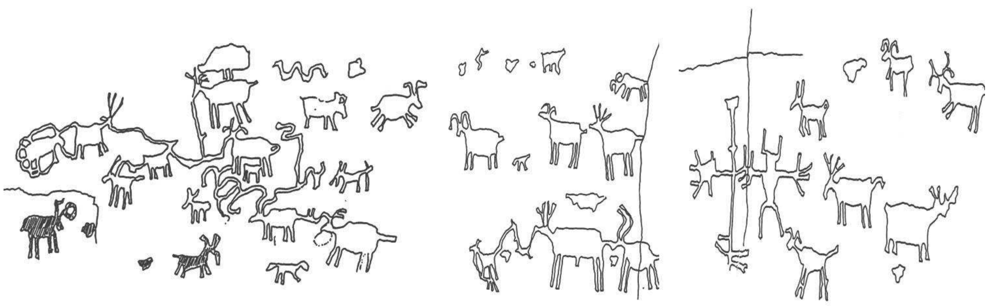


Figure 4.1: The "Zookeeper" panel at the Piñon Canyon Maneuver Site in southern Colorado. The combination of multiple animal species and an anthropomorph with unusual features such as an elaborate headdress has been suggested to be an indication that the rock art was connected with the mythological concept of the sacred home of the animal spirits (Wintcher 2004). After a drawing by T. Moody.

will be found in much of the rock art in a given region. Shamanistic motifs, on the other hand, represent supernatural concepts which are important to all such ritual practitioners (shamans), so it is expected that a small number of motifs will dominate the rock art in a region. Secular art, which is "art for art's sake" in the sense that it is not created by ritual specialists for religious purposes (Sauvet et al. 2009:322), is expected to be found in similar frequencies and appear in most sites. These predictions were summarized in a simple matrix diagram in which each cell represents an expected combination of motif frequency and distribution, corresponding to each model, however, there was no empirical case which fit a pattern of motifs occurring in high numbers but in few sites.

4.3 Deliberate uses of imagery

Rock art is not merely a passive reflection of life and society, but also a generative and sometimes subversive force. This understanding allows for the consideration of human agency in rock art research: "the manipulation of, among other things, material culture by people who, in many cases, have a clear conception of what they wish to achieve and the means by which it can be achieved" (Lewis-Williams 2002:249). A mixture of religious and secular connotations may be responsible for the patterns of distribution observed today (Sauvet et al. 2009:331). Rituals permeate the lives of traditional societies, and are considered to be essential aspects of technology (Boyd 1998; Schiffer 2001; Walker and Schiffer 2006; Walker 1998, 1999). It can be argued that art (in the general sense of imagery), and the rituals which accompany its production, are fundamental aspects of life in traditional societies and permeate all aspects of life, whether religious or not (see examples in Boas 1955:157; Dorsey 1904; Irwin 1994:191; Sundstrom 2002:102-103; Walker 1999). Art is also seen as a functional entity, containing the power to effect change in the world (see, for example, Boyd 1998:27). The differential portrayal of motif types both in terms of the characteristics of the site and the combination of motifs on panels suggests that the authors of the post-Palaeolithic rock art held a similar dialogue with the landscape, supporting the suggestion that differences in style are evidence of the outcomes of negotiations, conflicts, and performances connected with the emergence of the Neolithic social milieu. The differential distribution of motif types both on panels and in site types confirms the impression of an active ritual dialogue between the people and the place. The imagery is clearly not evenly distributed across the landscape, as one might expect if the images were casual or created by people who are not ritual specialists (Sauvet et al. 2009).

There are two possible ways in which the social pressures idea might be applied to post-Palaeolithic rock art. First, if the chronology is accurate and the three styles do in fact emerge together at the beginning of the Neolithic and in response to the same changes in the social landscape, then an analogous situation to that noted in southern Africa (Mazel 2009) might have prevailed, in that the local hunter-gatherers may have been in the process of becoming more complex, as Cruz and some others argue. The gradual adoption of artefacts and other items through trade networks may be evidenced by the apparent mixing at some sites, and a similar ritual response to changes in social pressures and constraints on traditional movements and conflict resolution could have prompted the emergence of the Levantine style, and perhaps even the Macroschematic could be interpreted as a means of invoking the supernatural powers of a particular entity recognized by one's rival neighbours (in that the existing hunter-gatherers saw the motifs and incorporated them into their own rituals, at least in a few instances). At the other end of the time scale, when the Levantine style seems to disappear but the Chalcolithic develops, including the distinctive carved idols and idol-like motifs in ceramics and other portable artefacts, the increasing need for water and resource control that Chapman and others have argued are a hallmark of this time could be invoked as a similar source of stress leading to changes in ritual activity. The association of some sites with burials, especially of Eneolithic or Chalcolithic date and the fact that these sites are analogous to Fairen's type 1 sites, ties in well with the need for resource control if we accept Chapman's arguments. The correspondence is not absolute, however, as the motifs at the sites are somewhat different. Canto Blanco appears to be Levantine, rather than Schematic; Los Grajos III, El Milano, and the Peña Rubia sites do not have ramiform or ocular type motifs, and not all of the idol-like motifs are found in sites similar to the type 1 sites. However, this possibility is worth considering.

If certain kinds of sites are linked to resource control and water sources, especially the Schematic sites (Fairen type 4, for example), this ties in well with Chapman's arguments for increasing complexity in the Chalcolithic, if we consider that at least some Schematic motifs belong to this era (especially sites such as Los Cuchillos). There are almost certainly multiple phases in the Schematic. Although the Neolithic period in Mediterranean Spain is, by definition, characterized by new artefact types and economic patterns (especially ceramics and domesticated crops and livestock), as well as an increasingly sedentary settlement pattern, transhumance and general population mobility seems to have remained important throughout this time (Fairén Jiménez forthcoming:13; Fairén Jiménez 2007:137; San Nicolás del Toro 2005; see also Halstead 2002). It is of course essential to an agro-pastoral economy in a dry environment that flocks or herds of animals have access to new areas of pasture and water sources, an economic pattern which persists to the present day. It also appears that settlement sites in some regions (for example, the Alcoy area of Alicante) were frequently relocated, probably as a response to poor agricultural conditions in such a climate (Fairén Jiménez 2002*a*). The caves and rock shelters distributed around the rock art sites in Alcoy were not continuously occupied, suggesting that they formed a network of places of varying importance distributed around the main settlements, in a logistical resource system (Fairén Jiménez 2007:137). Although the economy was shifting to an agricultural system the apparent frequent shifts in settlement location suggest a relatively high mobility; the predominance of hunting themes in Levantine style rock art may reflect this. An increase in the number of Schematic motifs is observed in parallel with the population expansion into new areas and a greater diversity of decorated shelters. The first instances of Levantine motifs in the same shelters are seen at this time, but they are also found in isolated locations, possibly as local boundary markers (Fairén Jiménez 2004*b*:9). Schematic and Levantine styles of art always appear together in shelters (Fairén's Type 5) which control access to mountain passes on the periphery of the territory (Fairén Jiménez 2004*b*:9). Therefore, this spatial pattern appears to indicate increasing territorialization and the consolidation of resource production, population growth, and increased social complexity, which continues into the Bronze Age (Fairén Jiménez 2004*b*:9).

There is some evidence that while the Neolithic chronological period in Mediterranean Spain saw the introduction of agriculture, which by its very nature requires a strong connection to a particular location in order to plant and harvest crops, the population did not become exclusively sedentary (Fairén Jiménez 2007:137). Indeed a long-standing historical tradition of transhumance in the Iberian Peninsula, as flocks were moved from one region to another in the course of the year in order to take advantage of changing grazing conditions, has been suggested as a suitable analogy for the type of pastoralism which may have existed during the Neolithic in this area (Cruz Berrocal 2005*b*; Peña Chocarro 1999). The Murcia data can be interpreted in similar terms to the Alicante case: the advent of rock art in the Neolithic was closely related to the nascent productive economy, which remained fairly mobile and retained a dependence on the exploitation of all resources, not simply agricultural products, a pattern present since the start of the Holocene. A primary feature of such an economy is small-scale pastoralism, with short or medium distance transhumance around the primary residential areas, in which the surrounding rock shelters play an important part in maintaining the flocks or herds (see San Nicolás del Toro 2005). In such a system, the contrasts between the rock art styles could be understood as a product of increased economic and role specialization, as those concerned with pastoral and agricultural aspects concentrated on different locations (Fairén Jiménez forthcoming:13, see also Halstead 2002).

The coexistence of distinct styles is best understood as a product of specialized economic and ceremonial activities (Fairén Jiménez forthcoming:13). Many authors argue that the best information available points to the styles being more or less contemporary, and the internal chronologies of each style suggest they were continuously developed over time, which indicates that the sites retained a common ceremonial significance which is partly expressed through different contemporary styles. The contrast between styles points to social differences in the creation and use of the imagery; however, because the main styles overlap for much of their distribution, at least in the regions where both Levantine and Schematic images are found, it is difficult to unravel these differences basis of style distribution alone. Recently it has been proposed that the overlapping distribution of different styles of rock art in Mediterranean Spain are products of different ceremonial and economic uses, but the distribution at the level of style itself is too similar to show any interpretable patterns (Fairén Jiménez 2007). This coexistence of distinct styles in a landscape only known to be occupied by agro-pastoral communities is best understood as a product of the life ways and social behaviour of the makers (Fairén Jiménez forthcoming:13). Although the location of rock art sites, and the overall territory occupied by the people who created them, may be constrained by practical factors (that is, economic and ecological limits, or competition with neighbouring groups), these limits are interpreted through cultural and ritual lens, and influence ideas about the nature of the world and the ways in which humans interact with it. The persistent depiction of certain motifs in similar locations suggests a continuity of the meaning or symbolic associations of those locations, because the differences in motifs in place reflect a sense of how the world works.

Chapter 5

Fieldwork and analysis methods

Despite early attention to sites in the Altiplano, especially Cantos de la Visera and Mediodía, which were studied by the Abbe Breuil and Juan Cabré shortly after their discovery (see section 1.3), there has been little regional synthesis of the Altiplano and Vega Alta areas. Several new sites have been identified in this region in recent years, suggesting that it forms an important group in its own right (Alonso Tejada and Grimal 2005*b*:248); however, the majority of the recent work has been descriptive in nature, leaving a gap in our understanding of post-Palaeolithic rock art. This chapter first explains the study area selection criteria, including the distribution of rock art in the Altiplano and Vega Alta areas and gaps in the existing research. Second, the fieldwork and data collection process is described, including field procedures, the analysis of photographs, and the compilation of the database of individual motifs (a report of the field work and data collection completed and discussion of the sites studied is presented in chapter 6). Third, the statistical and mathematical procedures used in later analyses are reviewed. Finally, the process of defining motif types, modelled on methods described by Loendorf and Francis (Francis 2001; Francis and Loendorf 2002; Loendorf 1989; Loendorf and Kuehn 1991; Loendorf and Porsche 1985) is explained, as well as the use of field observations to define the landscape variables.

5.1 Study area selection

This study focuses on a group of sites located in the northeast area of the province of Murcia, particularly sites near Jumilla and Yecla in the Comarca del Altiplano, and sites near Cieza in the Vega Alta of the Segura River area (figure 5.1). The study area is approximately 1,800 square kilometres, roughly demarcated by Monte Arabí in the northeast and Mula in the southwest. As an underlying theme in the present study

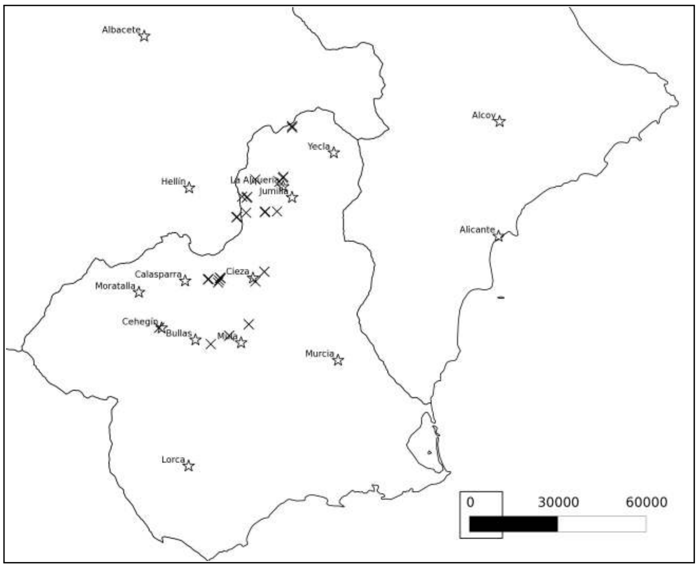


Figure 5.1: Overview of the study area. Coordinates for sites in close proximity (such as Buen Aire I and II, which are in adjacent rock shelters) are combined to improve readability.

is exploring the relationship between the Schematic and Levantine styles, the limited distribution of Levantine style art in the Iberian Peninsula to the eastern Mediterranean coastal region formed a natural limit to the sites which could be included in the current project. Secondly, the Altiplano and Vega Alta sites lie in a junction of natural routes between the ranges that make up the mountains of the Baetic System, a location which bridges several important groups of sites, including Alpera and Minateda in Albacete, Moratalla and Lorca in western Murcia, Alcoy in Alicante, the gorges of Valltorta and Gasulla in Castellón, and Bicorp in Valencia. In recent years multiple projects have addressed these major concentrations of rock art, especially from a landscape perspective (for example, Cruz Berrocal 2004*b*; Domingo Sanz 2004; Fairén Jiménez 2006; McClure 2004; Torregrosa 2000-2001); however, despite the existence of major sites the Altiplano and Vega Alta areas are relatively under-studied.

New discoveries of rock art recorded since the designation of post-Palaeolithic rock art as a UNESCO (1998) World Heritage List property bring the number of known sites in the area to forty-one, while also confirming the discontinuous distribution of the rock art compared to the surrounding regions. Survey work in the Yecla area of the Altiplano revealed no new rock art in the vicinity, despite the singular concentration of imagery at Monte Arabí (Alonso Tejada and Grimal 2006*a*:60). In the Jumilla area, surveys beginning with lesser-known ranges (such as Sierra del Molar) revealed both areas where the absence of sites was confirmed, as well as revealing new sites (Alonso Tejada and Grimal 2005*a*, 2006*b*). This distribution, and the absence of sites in the interstices, suggests that the sites in this area are related to each other as a distinct group. Other studies of post-Palaeolithic rock art have focused on a similarly constrained region defined by the presence of particular style or a distinctive geographic distribution; prominent examples include Fairén's analysis of the Alcoy area (Fairén Jiménez 2002*b*, 2006), Alonso Tejada and Grimal's (1996) study of the Taibilla region, and Domingo's (2004) study of six sites in the Valltorta area with intensive recording and analysis of digital photographs. Through deliberately focusing on a single constrained area, this study contributes to a deeper understanding of the patterns of rock art distribution at this local scale.

As noted in chapter 2, Fairén (forthcoming) has studied patterns in the locations in which rock art sites in Murcia are found; however, as with other studies of this nature focusing on other regions of the Mediterranean (for example, Cruz Berrocal 2004*b*; Fairén Jiménez 2006), the imagery was considered mainly in terms of style in its broadest sense, and was divided into either Levantine or Schematic groups as a primary analysis step. The results of similar investigations in adjacent regions, particularly the Alcoy area of Alicante and the Valltorta area of Castellón, suggest that this is a fruitful line of inquiry in understanding the use of place and association of rock art with world view. Although the rock art in the Altiplano and Vega Alta area does not exist in isolation and exhibits some features which suggest a transition between broader regional groups, the area retains a unique character. The sites in the study area are also located in multiple landscape and environmental contexts, meaning that no single context can fully account for the range of imagery found in this area. Sites in the Altiplano area, centred around Jumilla, are located in a semi-arid basin and range type mountain system with dramatic contrasts between mountains and plains. By contrast the Vega Alta area, centred around Cieza, has fewer contrasts between high and low elevations and more natural sources of water, which has been suggested to be a factor in the location of at least some groups of sites (Salmerón Juan et al. 2000:694). Because of this variability no single combination of style, motif, or site context dominates, which means the region is a useful area in which to examine the multiple relationships between motif and landscape.

The apparently transitional nature of this area is enhanced by the presence of multiple styles or sub-styles, as well as significant formal variation in the motifs present. As is observed elsewhere within the distribution of post-Palaeolithic rock art, multiple styles often occur together and it is sometimes difficult to firmly assign a given motif to a particular style. Regional differences in rock art styles throughout the Mediterranean area indicate that patterns observed elsewhere do not necessarily apply to the Altiplano and Vega Alta areas, however, or that social changes associated with the advent of the Neolithic may not have manifested in rock art in the same way. Thus there is scope to extend the existing research by maintaining the focus on the relationship between the imagery and its physical context, which has yielded interesting results in post-Palaeolithic rock art in general, but which also takes into account the unique characteristics of this area, as well as deepening understanding of the relationships inherent in the rock art itself through a focus on motif types rather than broad styles.

5.2 Fieldwork and photograph analysis

Objective 2 of the present research project (see page 14) is to compile a database of information about the sites and individual figures, derived from fieldwork, photographic analysis, and the review of published works as needed. This section describes the methods of collecting data, including field visits, the use of published sources where field visits were not possible, and the analysis of photographs. There were two main objectives of the fieldwork. The first was to collect data about the geographical context of the rock art sites, including noting any unusual features of the site, panel, and surrounding area. The second objective was to obtain photographs of the imagery for further analysis using digital modification, in addition to making general observations about the rock art and its relationship to the site as a whole. Processing the photographs after field work with multiple software programs was performed in order to supplement field observations. Data about the sites studied was supplemented with information drawn from published sources where available, and compared to my own observations about the site and the motifs in question. After field visits were completed, the recorded data was transcribed into a relational database (see appendix A). Information about the rock art in these sites was obtained through field visits in most cases, except where access was blocked or health and safety concerns prevented access (see table 5.1).

5.2.1 Field survey

The sites included in this study include all of the known post-Palaeolithic rock art sites in the area at this time, with the exception of some amorphous areas noted in Almadenes Canyon which are too deteriorated to confirm as post-Palaeolithic (see Salmerón Juan et al. 2000). Sites were identified through consultation of the existing research literature and meetings with other archaeologists in Spain, especially Emiliano Hernández and Miguel San Nicolás del Toro, who advised me on the locations of sites and the best way to access them. Prospective surveys (such as those described in Banning 2002) to locate new sites were not conducted as part of the present study, due to the recent work completed by Alonso Tejada and Grimal (2005*a*, 2006*a*,*b*), although the surrounding areas of known sites were explored during field work when possible. Data

Site Name	Seasons Visited	Inacessible	Reason
Buen Aire I and II	2006, 2010	Enredaderas I - IV	Need climbing gear
Canto Blanco	2010	Laberinto	Need climbing gear
Cantos de la Visera	2007, 2010	Lomo del Herrero I and II	Dangerous access
Cejo Cortado	2010	Monje III	Need climbing gear
Collado de las Hermanas	2007	Palomas	Earthquake blocked entrance
Conchas	2010	Paso I and II	Need climbing gear
Cuchillos	2010	Peliciego	Dangerous access
Gargantones	2006	Pucheros	Need climbing gear
Grajos I, II, and III	2007, 2010	Rumies	Need climbing gear
Humo	2010		
Junco I and II	2007		
Mediodia	2007, 2010		
Milano	2007, 2010		
Monje II	2007		
Pedrera	2006, 2010		
Pico de la Tienda I and II	2007		
El Pozo	2007		
Serreta	2007		

Table 5.1: Sites in the study area that were visited during field work, and those which were not accessible.

about each site were collected in the field using a paper recording form (appendix E) which loosely followed forms used in similar projects (Colorado Office of Archaeology and Historic Preservation 2010, Loendorf 2001:62-63, Loendorf et al. 1998:62-63, Sharpe and Barnett 2008). The specific information recorded and the format of the form was modified to reflect the goals of the current project; as others have noted (for example, Clegg 1983:102), the aims of a particular research project will dictate the information that is recorded on such forms. Some of the data which was originally recorded during field work was excluded from the final research questions, based on the results of preliminary analysis. Each panel was recorded on a separate form, which was divided into sections covering several aspects of each site and panel, as well as an inventory of the motifs themselves. These paper records form the basis of the database, amended as needed based on the results of photograph and GIS analysis, and further library research.

Visits to the study area took place in 2006, 2007, 2008, and 2010. Over the course of these trips it was possible to make multiple visits to Buen Aire I and II, Barranco del Junco I and II, Cantos de la Visera I and II, Cueva del Mediodía, El Pozo, Cueva del Monje II, Collado de los Hermanos, Gargantones, El Milano, La Serreta, Los Grajos I, II, and III; Pico de la Tienda I and II, Los Cuchillos, Canto Blanco, Cejo Cortado, El Humo, Las Conchas, and Solana de la Pedrera (see table 5.1). On some visits I was accompanied by other archaeologists or museum staff who provided access to sites which are protected from vandalism with locked iron gates; however, much of the field work was conducted alone, particularly for recently discovered sites which are not gated. Because of this lone working, health and safety concerns precluded a visit to some sites. Attempts to reach Peliciego and Lomo del Herrero were abandoned due to the difficult access and isolated location. Similar health and safety issues prevented visits to several sites in the Almadenes canyon area (Enredaderas, Laberinto, El Paso I and II, and Rumíes), Cueva del Monje III, and Los Pucheros, which require climbing gear to reach. Access to the cave site of Las Palomas was unfortunately blocked by a small earthquake just before a scheduled visit.

During each site visit, the known rock art was first relocated using previously published drawings and photographs when available. The general location of the rock art within each site was noted, and the adequacy of available site maps and coordinates was verified. General observations about the location of the site relative to the surrounding area include a note of the local vegetation, the type of land form the site is located in, an estimation of the rock shelter size, and the overall orientation of the site. Landscape characteristics such as the local topography, visibility, viewshed, and accessibility of the site were also noted, and details warranting further investigation through the examination of maps and GIS were noted (such as the possible intervisibility between sites). Differences between existing recordings and my own observations were noted as appropriate, including instances in which I was unable to relocate the imagery. A general description of each motif was entered on the data form, together with a rough tally of the number of motifs of each class and style present on the panel. Each identified panel was photographed (see section 5.2.2) with particular attention to unusual details and newly identified motifs as needed. A scale was included in the photographs when possible, although this was not always practical due to the fragile nature of the rock surface and the risk of accidentally damaging or obscuring very faint paintings.

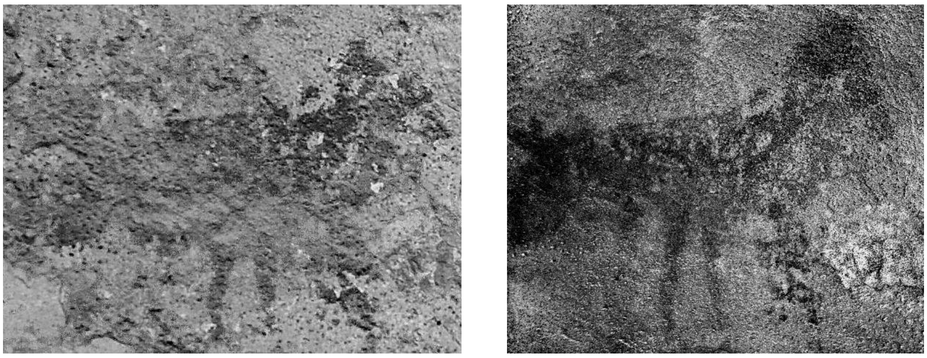
Basic information about the sites, including the name of the site, province and administrative region in which it is found, and the relevant Instituto Geográfico Nacional "Mapa Topográfico Nacional de España" (1:25,000 scale) series topographic map number was recorded for convenience. The site coordinates were recorded in UTM format and later converted to the equivalent latitude and longitude as needed, using the conversion calculations reported by Dutch (2009). The coordinates of each site were recorded in the field using a hand-held GPS when possible, though in cases where I was unable to obtain a useful reading the source of additional information was noted. In cases where a visit was not possible or the GPS unit was unable to connect with enough satellites to obtain a sufficiently precise reading, this information was derived from relevant publications (Mateo Saura 1999), given to me through personal communications (Miguel San Nicolás de Toro and Emiliano Hernández), or estimated through an examination of topographic maps and satellite imagery. Digital Terrain or Elevation Models (DTMs or DEMs) from the publicly available NASA Shuttle Radar Topography Mission (SRTM) data set[1] were used to provide basic map data. These were further manipulated with open source GIS programs, including qGIS and MicroDEM, in order to produce maps and allow for the basic characterization of the site locations in geographical terms. Coordinates for the general location of some sites were initially taken from the UNESCO World Heritage List (1998) documentation on the post-Palaeolithic rock art, but these were corrected using other sources following the problems noted by Cruz (2005*b*:173). While it is standard practice in many countries not to publish coordinates, many of the Spanish works referred to here include this information, and the coordinates collected by UNESCO are in the public domain and available on-line[2]. Coordinates for the sites in Almadenes Canyon which I was unable to visit are published in Salmerón Juan et al. (2000:695).

5.2.2 Photography and photograph analysis

Photographs were taken with several cameras, depending on what was available for different visits, including basic point-and-shoot digital cameras (5 and 6 megapixels), a digital single-lens reflex camera (Nikon D80, 10.2 megapixels), near-infrared digital (modified Nikon D100, 6 megapixels), and 35mm colour or slide film with a manual camera (Pentax K1000). The film photographs and photographs derived from other publications were digitized at high resolution using a desktop scanner, and all images were digitally modified as needed in order to obtain images which were suitable for further analysis. Experiments using the modified Nikon D100 DSLR camera to take near-infrared photographs were somewhat successful, but did not provide a dramatic benefit. Although this technique has in other archaeological cases made images which are indistinguishable to the human eye visible (for example, Verhoeven 2008:3089), it was of limited utility here. However, it was helpful in distinguishing certain motifs and bringing out details in others, such as the zoomorph at Canto Blanco (figure 5.2).

[1] SRTM data is used courtesy of the U.S. Geological Survey. USGS and NASA data is public domain and freely available for use. See appendix F for further details.

[2] UNESCO World Heritage Convention, Rock Art of the Mediterranean Basin on the Iberian Peninsula ("maps" tab), http://whc.unesco.org/en/list/874/multiple=1&unique_number=1026



(a) Modified conventional photograph **(b)** Modified infrared photograph

Figure 5.2: Zoomorph figure, Canto Blanco. Figure a is a modified image taken with a conventional digital camera, while figure b was created by modifying a near-infrared image. Note that different details are highlighted by different photographic methods. Both photographs were taken on the same day. Photographs by the author.

Digital enhancement of photographs can provide a significant benefit in revealing motifs which are otherwise invisible, and is widely used in rock art research including post-Palaeolithic rock art (for example, Clogg and Díaz-Andreu 1999; Díaz-Andreu et al. forthcoming *a*; Domingo Sanz and López Montalvo 2002; Domingo Sanz 2004; Mark and Billo 2002; Mark and Newman 1989). Specific techniques and software vary widely and change rapidly; however, the main procedures and goals remain similar. Image processing in the present case was completed using multiple software programs, primarily the GNU Image Manipulation Program (GIMP)[3] and ImageJ with the DStretch plugin[4], which is specifically designed to enhance rock art. The DStrech plugin uses a process called "decorrelation stretch", which analyses the colours in the photograph and creates a false colour image based on the variance between the colours (Harman 2008). Different aspects of the image are emphasized depending on the specific options chosen. Some panels contain multiple colours which are emphasized with some DStretch options but obscured by others. In these cases the different results were

[3]GNU Image Manipulation Program, Linux version 2.7.2, available from http://www.gimp.org

[4]ImageJ (Image Processing and Analysis in Java), version 1.44, available from http://rsbweb.nih.gov/ij/index.html. DStretch plugin for the enhancement of pictographs by Jon Harman, version 7.1, available from http://www.dstretch.com/index.html

combined using the layers feature of GIMP. Further manipulation of the photographs, such as changing the saturation and hue of different colours separately, was also useful in revealing details which were not visible in the original photographs. In practice this requires a process of trial and error to obtain useful results, as the results of each option will change depending on the specific colours present in the original photograph, which is a factor of the lighting conditions, rock surface colour and texture, camera settings, and the rock art itself. In some cases the rock art is now so poorly preserved that this intensive manipulation resulted in only marginally improved images, such as at Buen Aire I. However, in other cases, such as La Serreta, this technique revealed motifs which do not seem to have been mentioned in the existing publications (see chapter 6).

5.2.3 Supplemental data

In cases in which I was not able to visit a site in person, the database was completed through analysis of published photographs and descriptions of the rock art and site location which allowed me to glean enough information to include the sites in the study. All of the sites studied here have been published in some form, and the focus of the majority of these publications has been descriptive accounts of new discoveries or recording efforts. Many of these existing publications, for example Mateo Saura (1999), include site maps, itemized descriptions of the rock art, drawings, and photographs, usually including an overview of the site. This literature provides a good resource for further work, in that the descriptive nature results in the presentation of many details such as site plans and comprehensive photographs and drawings which might be omitted from more thematic works. However, the information reported for some sites is less comprehensive, particularly for the small sites in Almadenes canyon which are very difficult to reach and are poorly preserved. In these instances it would have been impossible to include some sites in the study without the use of publications; however, it is recognized that further work with enhanced photographic techniques may reveal more details beyond the amorphous remnants of pigment currently reported. The quality of these supplemental sources of information is noted as appropriate in the site description section (chapter 6). It is also important to note that while the database in appendix A was completed using information from these sources, the photographs and drawings are analysed in the same manner as data collected during field work, and descriptions of unillustrated motifs are compared to my own assessment of other motifs in the study area.

In some instances minor discrepancies and a few new motifs were noted (at Cejo Cortado, Los Grajos II, Los Cuchillos, and La Serreta). Areas of disagreement or ambiguity are noted in the database and discussed as appropriate in chapter 6. Although these instances demonstrate that the published recordings are not always completely accurate, it is also commonly observed that changes in the quality of daylight can reveal or conceal rock art, especially faded or minuscule elements such as those noted here. Some images are very difficult to discern in the best of circumstances due to their faded nature. In some cases known images could not be relocated despite multiple field visits and and photograph enhancement. Junco I was visited in multiple weather and lighting conditions, but I was unable to locate the motifs reported by Alonso Tejada and Grimal (2005*a*). Similarly, Alonso (in San Nicolás del Toro 2009) reports several motifs at El Milano which were not recognized by Mateo (1999), and which I could not identify in repeated visits to the site. Each case is described in the following discussion in chapter 6 as appropriate.

5.3 Statistical and mathematical methods

The choice of statistical methods is constrained by the nature of the data and the assumptions of the statistical tests themselves. Because the data recorded here is non-parametric and categorical, rather than continuous[5], hierarchical clustering was the only multivariate method used. Simple techniques, such as comparing frequencies and sorting the database using SQL queries, were sufficient to address some of the research questions.

[5] In statistical terms, data are generally described as being nominal (or categorical), ordinal, interval, or ratio; and can be either continuous or discrete. The classification of images into groups results in data which are discrete (that is, cannot be described in fractions) and categorical (individual cases are described by their membership in a group, rather than as a measurement of a variable). Because the categories defined here are not ranked with respect to each other, and are not based on numerical measurements, the data do not meet the definition of the other data types.

Chi-square tests of independence were also used as appropriate to test the probability that certain combinations of variables were statistically associated with each other.

5.3.1 Cross tabulation and comparison of frequencies

All of the motif and site information compiled from fieldwork, photographic analysis, and the review of published works (see objective 2) was stored in a relational database based on SQL, a widely used database engine. This allowed for the flexible sorting and grouping of variables defined in tables of data in order to reveal specific relationships as well as formatting tables of data to be exported to statistical analysis software or a spreadsheet for further calculations. In addition to general information management, the computational abilities of SQL are used to perform a cross-tabulation analysis, a method which is often used to examine categorical data, or the frequency with which each case exhibits each variable. This type of analysis is used here to examine the relationship between motif types which are found together on panels, in tandem with other statistical tests. The cross-tabulation query calculates the number of panels on which motif type x also occurs with motif type y. In other words, the query first counts the number of panels on which at least one example of each motif type occurs. The result of this count is then compared against itself in order to produce a matrix which shows the proportion of panels in which each motif type occurs with any other motif type. The results of this cross tabulation are shown in section 7.3.1 (beginning on page 198). In order to assess the statistical significance of the results, two additional statistical tests are applied to this result in tandem. First, a series of chi-square tests calculates the statistical significance of each pair of motif types, using Yates' correction as necessary. The strength of these associations is then tested through the calculation of the phi coefficient. Both procedures will be briefly explained here for clarity. The actual statistics were calculated using a series of SQL queries, which are presented in appendix A.

Chi-square test of independence

The chi-square (χ^2) statistic compares the observed and expected frequencies of a given phenomenon, and is used to test for homogeneity or independence of variables in a group of categorical data[6]. The theoretical assumption is that the observed sample is a part of a normally distributed population, or that the sample variables do not affect each other. A null hypothesis (denoted as H_O) is defined as no association between the variables in question. If the chi-square result is greater than the critical value, or the probability that the association is derived from chance alone, then the null hypothesis is rejected, indicating that there is a statistically significant association between the variables. Although chi square will measure whether or not two variables are independent, this does not necessarily say very much of interest about the phenomena in question.

Yates' correction for continuity

One of the key underlying assumptions of the chi-square test is that the counts of data in each cell with be sufficiently large to produce a useful result. A common value is that each cell count should be at least 5 in any 2-by-2 contingency table. However, if this condition is not met, a variation called Yates' correction[7] can be used instead. In effect this correction

[6]The chi-square (χ^2) statistic is calculated with the equation $\chi^2 = \sum \frac{(O-E)^2}{E}$, where O is the observed and E the expected frequency of the variable in question. The expected frequency is calculated by multiplying the row total by the column total, and dividing the result by the total number of observations in the whole table. In a contingency table with cells a, b, c, and d, for example, the value for cell a will be $\frac{(a+b)(a+c)}{a+b+c+d}$, for example. Typically the hypotheses to be tested are expressed as H_O: the variables **are** independent, and H_A: the variable **are not** independent. In order to determine this, the result of the chi-square equation is compared to the value that would be expected in the theoretical normally distributed population, where the variables do not affect each other. Depending on the chosen P value, or estimated probability of making a type I error of rejecting the null hypothesis when it is actually true, the appropriate value is selected, usually from a published table of values (in this case, I used the table of chi-square statistics published by NIST/SEMATECH 2010). These tables are organized by the degrees of freedom, calculated as $df = (C-1)(R-1)$, where C is the number of columns of the first variable and R = number of rows of the second variable to be tested. If $\chi^2 < P$, the null hypothesis is **accepted**; if $\chi^2 > P$, it is **not accepted**.

[7]This is calculated with the equation $\chi^2_{\text{Yates}} = \sum_{i=1}^{N} \frac{(|O_i - E_i| - 0.5)^2}{E_i}$. In this variation, O_i is the observed frequency, E_i the expected frequency, and n is the number of cases.

reduces the value of the chi-square test result, and the over-estimation of statistical significance, for small data sets. This may lead to failure to reject the null hypothesis in cases where a relationship does in fact exist; however, because the frequency of occurrence of many of the variables studied here is low, this correction was applied to those cases as appropriate.

Phi coefficient

A useful statistic in this context is the *phi* (ϕ) coefficient, a measure of association which provides an indication of the relative strength of the correlation between the two variables being tested. Measures of association are useful because although a chi-square test may show statistical significance, the relationship may not be particularly important. The phi coefficient is only applicable to a 2-by-2 contingency table (showing the relationship between the presence or absence of a given motif type in a group of panels, for example). The result of the test is expressed as a number between 0 and 1, with a lower value (below approximately 0.3) interpreted as a weaker association, and a higher value (above approximately 0.7) a stronger association. Because this is only useful in cases where the chi-square analysis has shown significance, this statistic is only calculated here accordingly. The results of both the chi-square and phi coefficient tests are represented as a matrix which complements the underlying cross-tabulation results and provides an indication of which combinations of motifs are significant.

5.3.2 Comparison of frequency and percentages

The comparison of the frequency with which different aspects of the data set occur was used to address several questions, particularly in defining motif types. As explained in section 7.1, the frequency with which each design element occurs in a given class of motif is compared to other design elements. The results informed the decision to apply further analytical techniques as appropriate. The comparison of frequencies is also used to examine the relationship between motif type and location, taking the analyses in Sauvet et al. (2009:330) as an example. In particular, the percentage of sites at which particular motif types and classes appear is compared to the frequency with which each motif type or class is found in the study area as a whole, and the proportion of the total number of recognized motif types which are represented at a given site compared to the proportion of the total number of motifs recorded in the study area that each type represents. Sauvet et al. use this comparison to test Kintigh's (1989) hypothesis that the diversity of motif types present is relative to the number of motifs present, assuming that the motifs represent a shared meaning and motive for painting across the local groups which used the site (Kintigh was writing in the context of explaining Conkey's interpretation of Altamira as an aggregation site, based on the diversity and number of motifs present there versus other sites in the region). In the case of the Altiplano and Vega Alta, this approach is used to give an indication of the diversity of motif types and sites, with the underlying assumption that while the meaning behind the motif types is shared, the distribution of more or less complex (or diverse) sites represents different motives for painting those sites.

5.3.3 Cluster analysis

A common aim in the archaeological use of multivariate analytical methods is to reduce a "complex body of data... to a two-dimensional picture which is interpreted in the light of archaeological knowledge that may not itself be quantified easily" (Baxter 1994:3). There are many different types of multivariate analysis, suitable for different problems depending on the nature of the data in question. In particular, cluster analysis is often helpful in revealing patterns in the data which are not otherwise obvious. Cluster analysis has not been commonly used in studies of post-Palaeolithic rock art, although this and other methods of exploratory analysis are often used in archaeology generally and there are many examples of their utility in the study of rock art elsewhere in the world (see, for example, Baxter 1994; Guinea and Heras 2001; Magne and Klassen 1991; Morwood 1980; Wilson 1998; Yates 1996). The underlying assumptions and the selection of the appropriate analysis options are explained here, as they differ from the default options commonly encountered in statistical software.

Cluster analysis refers to several related methods which aim to group similar cases based on the variables they exhibit (Baxter 1994:142). This can be contrasted with methods such as principal components analysis, which aims to establish the proportion of common variance in a sample that is accounted for by a particular variable (Field 2009:637-638). Cluster analysis is used here to explore which sites are similar to each other, based on the presence or absence of different motif types and landscape characteristics. Several clustering methods exist; however, some of these are only applicable to data which is not categorical. Hierarchical clustering can be used with a categorical data set, although care must be taken to ensure that the analysis options selected are consistent with the nature of the data and with the questions which are asked. This is an iterative clustering method, which begins with every case in a cluster by itself, then compares each cluster with the remaining cases, and groups the existing cluster with the most similar case into a new cluster. This process is repeated until all the clusters have been joined into a single cluster. Cases are compared in pairs using a distance measure, while the similarity between clusters is calculated with a linkage function.

In the present case, cluster analysis was performed using the *hclust* and *dist* functions in the *R*[8] statistical analysis software environment (R Development Core Team 2011*a*). The first consideration is arranging the data into a sensible format. In this analysis each site was considered to be a case, while the motif types and landscape characteristics were considered to be variables, with the presence or absence of each variable coded as *1* or *0*. Secondly, an appropriate means of calculating the similarly between cases, or the distance measure, must be chosen. The type of data under analysis will determine the best distance measure. Although the unsquared Euclidian distance is often recommended as a standard method (Baxter 1994:156), this distance measure is appropriate for continuous variables, but is not applicable to categorical data. Rather, the distance measure used here is the Jaccard coefficient or binary measure, which is commonly used in archaeological problems involving presence or absence of particular items (Baxter 1994:149-152). According to the *R* documentation for the *dist* function (R Development Core Team 2011*b*), the "binary" option is an asymmetric binary measure, which is equivalent to the Jaccard coefficient. This distance measure is

[8]R Project for Statistical Computing, Linux version 2.13.0, available from http://www.r-project.org

appropriate when comparing pairs of cases with asymmetric binary variables, because negative matches -- or instances where the cases being compared both do not have a given variable -- are not counted as matches. Only instances in which at least one case of a given pair has the variable in question are taken into account when comparing those cases[9].

The third consideration is the linkage function, or the means of calculating the distance between the clusters. The *hclust* analysis function in *R* provides several options which provide different results. Some common methods and their assumptions (as described in Baxter 1994:158-159) are summarized here, together with the reasons why they were not used in the cluster analyses in chapter 7. Ward's minimum variance method, which is the default method used in many statistical software programs, is not appropriate because it calculates parametric statistics. The single linkage or nearest neighbour method can result in "chaining", an effect in which two cases are assigned to a cluster because they appear to be close together based on a single variable, even though overall the cases are not very similar. The complete linkage or furthest neighbour method assigns cases to clusters based on the overall similarity to cases which have already been assigned to those clusters. This avoids the chaining effect but may give unreliable results if the data does not have an inherent tendency to form distinct groups. A variation on these methods is the average or between-group linkage, which first assigns the two most similar cases to a cluster, then adds additional cases based on the similarity of each case with the average similarity of the existing cluster members. This method can be weighted according to the number of cases in each cluster, which is appropriate if the cluster sizes may be uneven. In the present case it is unclear what the cluster sizes are likely to be, and it is unknown whether the sites are likely to form discrete clusters, or if the differences between clusters will be less pronounced. The weighted between-group linkage method was chosen because of its

9 The simple matching distance measure is calculated with $d(i,j) = \frac{b+c}{a+b+c+d}$, which counts negative matches on a contingency table, such as that shown on the right. By contrast, the Jaccard coefficient or binary distance measure is calculated with $d(i,j) = \frac{b+c}{a+b+c}$, which does not.

	$Var.j$		
$Var.i$	a	b	a+b
	c	d	c+d
	a+c	b+d	

ability to overcome the potential chaining problems as well as effectively handle the uncertainty in the data.

5.4 Defining types and variables

The methods used to create a more detailed classification of the motifs in the study area is based on the methods described in Loendorf (1989:75-80) and other similar projects (Francis 2001; Francis and Loendorf 2002; Loendorf and Kuehn 1991; Loendorf and Porsche 1985). The process proceeds in several steps. First, the rock art is described in formal terms, noting details and design elements. Each motif was initially sorted into a generic class (anthropomorph, quadruped, linear or abstract, amorphous area), which was in turn sorted according to observed design elements such as the shape of the body or the presence of antlers and horns, and each motif is assigned to provisional classes or types. In the Piñon Canyon Maneuver Site case lists of the classes identified were cross-checked against the photographic record and each individual motif assigned to one of the identified classes. The process was repeated by multiple researchers and the results compared, with points of disagreement discussed and rectified by creating new classes to accommodate the questionable motifs. An analogous process is followed here, although in this case my own observations were compared with the existing publications. The definition of landscape variables is derived primarily from field observations, supplemented as needed with the analysis of satellite imagery and topographic maps. Although not every site could be accessed during field work, all of the site locations were visited, allowing observations to be made about the characteristics of the landscape in which the site is found.

5.4.1 Defining motif types

Following the Piñon Canyon study as a model (Loendorf 1989:75-80), the first step undertaken in the present study was to describe each motif as I perceived it, with an emphasis on describing details of the shape of each motif. My descriptions were then compared to published accounts and existing typological schemes where these were available. In this process it became apparent that these previously defined types were not always consistently applied or explicitly defined, and in some cases very similar motifs were described as belonging to different types or styles, leading to some confusion over the manner in which some motifs should be classified. It was also apparent that some motifs were identified as specific entities (such as women) or styles with little or no discussion of what features were considered to be diagnostic. To overcome this confusion, the descriptions of each motif were separated into design elements which describe various parts of each motif (for example, anthropomorph limbs, bodies, and heads). Each motif was grouped into an initial class (such as anthropomorph, quadruped, curvilinear and rectilinear lines) and further sorted using details such as apparent clothing, antlers or horns, and posture or actions (see Appendix A). The frequency of each design element and its relationship to other design elements is examined in a series of analyses, noting which characteristics appear together frequently, and refined into types which are sufficiently generic to be useful in describing multiple motifs but are not so detailed as to preclude comparison between sites or regions (Loendorf 1989:78). Some design elements were found to be sufficiently rare in the study area that they are considered to be variations on a broader type (for instance, the presence of objects or unusual body types), but the distribution of these variations is also considered in chapter 7. Examining the individual design elements shows that a given motif can have, for example, a skirt, or a skirt and a bow, or a skirt and a headdress. Using these design elements, or rather, the patterns of motifs which occur together, the next step is the creation of **descriptive types** themselves; or "a grouping of figures based on conscious recognition of dimensions of formal variation and consistent patterning of attributes (Francis and Loendorf 2002:44-45)". These types are not meant to be reflections of emic categories, but are a means of describing and analysing the motifs which is at the same time more detailed than style, but general enough to be more than a simple list of all the possible variation noticed by the researcher. This analysis of design element frequency and the resulting typology is presented in section 7.1.

5.4.2 Defining landscape variables

Four characteristics of the locations in which post-Palaeolithic rock art is found are examined here: visibility, viewshed, general accessibility of the shelters, and location with respect to the surrounding terrain. These variables were chosen in part because the results of recent work in the Murcia area (Fairén Jiménez forthcoming) as well as Alicante and Valencia (Cruz Berrocal 2005*b*; Fairén Jiménez 2004*b*) which indicate that these are likely to be the most strongly patterned characteristics of the landscape with respect to the rock art. As with any data set, there is a potentially infinite number of possible variables to analyse; however, characteristics which could be readily observed at a human scale were chosen. The result of previous work is an important consideration in selecting analysis variables. In the present case the main study to be considered is Fairén's overview study of the location of all the rock art sites in Murcia as a whole, including Moratalla and Lorca (Fairén Jiménez forthcoming). As noted in chapter 2, this study evaluated whether a distinction could be made between the distribution of the Levantine and Schematic styles at the site level, using a comprehensive set of landscape variables. The results indicated that the overlap between these styles was so great that the styles are best considered as relating to different purposes, rather than different groups of people or chronological periods. However, most of the landscape variables did not exhibit strong patterning with respect to the location of rock art sites.

Some of the variables which have been identified as significant in other studies were not included here because the significance of the connection seems to be misleading, or the results of previous work suggests that the potential connection can be dismissed as unimportant. In particular, the tendency of sites to be located near water courses and historic drove roads seems potentially spurious, as mentioned in chapter 4. Most of the sites (nearly 80% for both styles) were found to be within a 45 minute walk of a historic drove route, although the Levantine style sites tended to be slightly closer (Fairén Jiménez forthcoming:10). However, the convergence of water and rock shelters in accessible places may be interpreted as a factor of common geology, rather than a specific selection. Sites with Levantine style imagery tended to be located further from known Neolithic occupation sites than sites with Schematic imagery, as measured by the approximate walking time to reach them (two to three hours versus one hour); however, both are located within located within the expected catchment areas (Fairén Jiménez forthcoming:10-12). Both variables may be indications that both Levantine and Schematic style rock art is associated with similar economic concerns; however, it is also clear that neither variable is strongly associated with one style over the other, but rather serve to reinforce the overlap between the two styles.

Initial analysis attempted to classify the rock art sites in the Altiplano and Vega Alta areas into groups corresponding with the rock shelter types Fairén identified in Alicante (see table 4.1). However, because the rock art sites in the Altiplano and Vega Alta are different, this correspondence was not exact. Further, there is a relative lack of data about other kinds of archaeological sites in the study area, including burial and settlement sites. This limited the comparisons which could be made, especially the consideration of least-cost paths between rock art sites and settlements. However, there are some interesting links in the Alicante case which were may also be observable in the Altiplano and Vega Alta, even given these limitations. In particular, the association of simple schematic sites with high locations and good visibility with burials, large and complex sites with low elevations and major valleys where visibility seems unimportant, single-style sites in side canyons and passes with good visibility, and complex schematic sites in difficult to access mountain locations, sometimes associated with water. The possibility that some of the sites in the study area follow a similar pattern is considered in chapter 8.

Data about the nature of the site locations were derived from a combination of field observations and the study of topographic maps and satellite imagery. As noted in section 5.2, information about the visibility, viewshed, accessibility, and general location of each site was collected during field surveys. In general these qualities are readily observed through a visual inspection of the site and with simple equipment such as a compass. Although some sites could not be visited in person, due to their location these characteristics can be readily observed from nearby vantage points. For example, although it was not possible to reach the sites in Almadenes Canyon which require climbing gear, they are located either within view of or adjacent to the site of La Serreta, and this way their characteristics could be determined. Similarly, although I was unable to complete the climb to Peliciego, Monje III, or Lomo del Herrero, and Las Palomas was blocked by an earthquake, the site locations are clearly visible from the surrounding terrain, allowing observations about the nature of the site to be made without accessing the shelter itself. These determinations were compared with published overview photographs and site maps where these were available, although I was able to make direct observations about all of the sites studied here.

Visibility of the rock shelter is defined as either visible or hidden, as seen from the major valleys, natural route ways, and the slopes below the site. Although the rock art itself is not visible from a distance, either the rock shelters themselves or the land form on which the site is located is visually prominent, such as the top of a peak or an isolated mountain. Sites with low visibility, conversely, are generally located below canyon rims and cannot be seen until a person is standing within a few metres of the site. In some cases, although the rock shelter locations can be clearly seen, they cannot be readily distinguished from neighbouring shelters which do not contain any rock art or other archaeological remains. Some possible implications of this are discussed in chapter 8. Viewshed is categorized as a wide or restricted view from the rock art panels over the surrounding terrain. Wide view sites command a view over the main large valleys and have few permanent visual obstructions, even assuming woodland conditions, due to their position in rocky zones near the top of peaks and ridges. The sites are often oriented in such a way as to focus the view on the side valley in which the site is located. Restricted view sites are those which have little visibility beyond the location in which the images are found. Many of these are either located in canyons, where only the opposite wall of the canyon can be seen, or within caves with small openings. Site accessibility is classified as either easy or difficult. Sites considered to have difficult access are located above steep slopes or in areas which require climbing gear or rock scrambling to reach. Sites which are easy to access are located near valley floors or in areas of relatively low relief. These characterizations take into account the probable differences between a modern person's conception of a difficult hike and the viewpoint of a person accustomed to a more physically demanding lifestyle. Finally, the rock art sites are classified according to whether the location with respect to the surrounding terrain can be considered to be within a canyon, side drainage, or near the top of a mountain peak or ridge. This simple classification is based on both the results of previous analyses of rock shelter locations in Alicante and

Valencia (Cruz Berrocal 2004*a*; Fairén Jiménez 2004*c*) and examples from elsewhere in the world (for example, Rainsbury 2009; Taçon 1992).

Chapter 6 describes the field survey undertaken, including a discussion of points of disagreement about the rock art when these occur. Where appropriate details of the supplemental data sources are also given. The sites are grouped by political district and rough alphabetical order to facilitate the discussion. The analysis techniques described in section 5.3 are applied to this data in chapter 7 in order to first define the motif types, as presented in section 7.1. The distribution of these types is then analysed in two main dimensions. First, the combinations of motif types which occur on the same panels is analysed, with the aim of identifying patterns which may carry meaning as well as characterizing the relative complexity of the panels. Second, the motif types are analysed with respect to the landscape variables as described in 5.4.2. Finally, the patterns of motif type distribution which are identified in these analyses are compared and contrasted with the distribution of the rock art in terms of style.

Chapter 6

Survey of Altiplano and Vega Alta rock art

The general characteristics of each site and the observations made during field work and photograph analysis are discussed in this section, together with some information about the discovery and research history of the site. Several of the sites described here have associated archaeological remains; however, as these are discussed in chapter 3, they will only be briefly referred to here. Appendix A contains the full database of information collected about each motif, arranged by site; consequently the full details are not presented here. However, discrepancies noted between published works and field observations are discussed in the appropriate sections in the following discussion. To facilitate discussion the sites are grouped by political district, and then in rough alphabetical order. Sites in close proximity (in particular Almadenes Canyon, Monte Arabí, Los Grajos, and the sites in the Sierra del Ricote) are discussed together.

6.1 Altiplano: Jumilla and Yecla

The Altiplano area sites are fairly varied in terms of the size and location of the rock shelters, the type and style of the images, and the complexity of the panels. Most of the sites are located within or near the municipal territories of Jumilla and Yecla, with the exception of Collado de la Hermana and Pico de la Tienda (which are technically in Albacete). There are several sites in the Jumilla area which are less visually impressive, with only a few motifs now visible. However, these small sites are important in showing the extent to which the landscape was marked and demonstrate that this area was a focus of rock art creation (Alonso Tejada and Grimal 2005*b*:248).

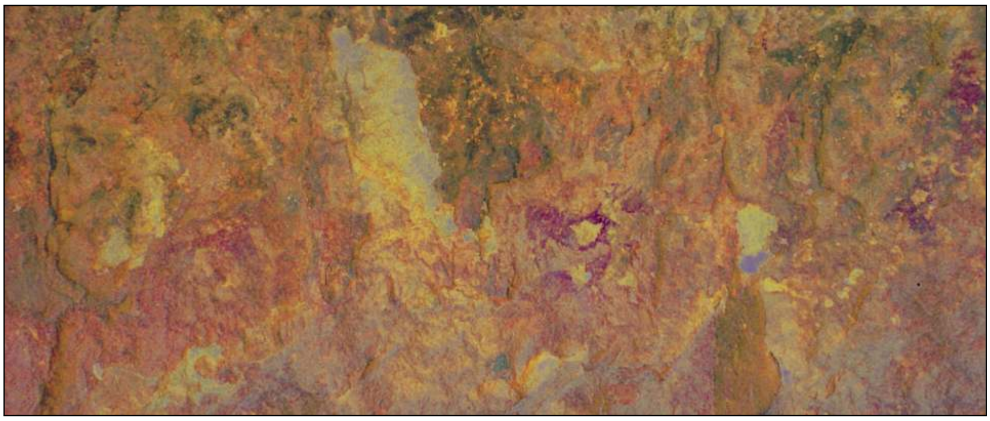


Figure 6.1: Detail of Buen Aire I, panel 1. The images on this panel are barely visible without digital modification. Photograph by the author, modified using ImageJ DStretch plugin.

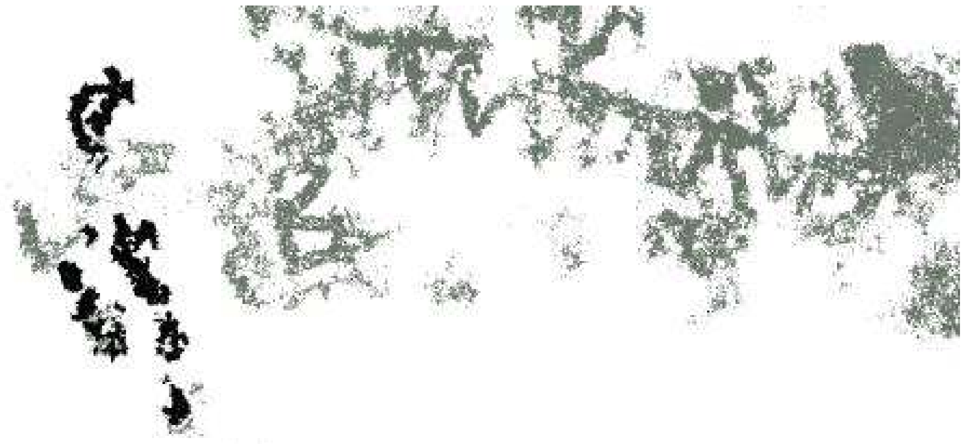


Figure 6.2: Schematic motif, Buen Aire I panel 2. Digital tracing from a photograph by the author.

6.1.1 Buen Aire I and II

Buen Aire I and II, discovered in 1985 (García del Toro 1985), are adjacent rock shelters, located at approximately 775 metres above sea level, near the top of a cliff on the eastern edge of the peak known as Peñarrubia (figure 6.3). There are several other rock shelters visible in the surrounding peaks, however, these have no known rock art. Buen Aire I is a large shelter with a high ceiling, containing two panels of elements. Panel 1, which is the main panel along the back of the shelter, contains approximately eighty-five motifs, as identified by Mateo Saura (2005*a*). Most appear to be Levantine style, although due to the poor preservation

Figure 6.3: Overview of the Buen Aire sites. Black circles indicate rock shelter locations. Buen Aire I is on the left, Buen Aire II is on the right. Photograph by the author.

these are very difficult to see and classify (see figure 6.1), and thirty-six of the elements can only be described as amorphous remains. Panel 2 is located near the ceiling in the centre of the shelter,and contains primarily Schematic motifs, the most prominent being a large zig-zag line (see figure 6.2. Buen Aire II is located on the same land form but a few meters away, and has a slightly different orientation. The shelter is much shallower than Buen Aire I, although it is a similar length. This shelter contains approximately 15 Schematic style images, including zoomorphs, groups of dots, and anchor-like figures, in four groups.

6.1.2 Monte Arabí: Cantos de la Visera and Mediodía

Cantos de la Visera and Mediodía were key in Breuil's Palaeolithic chronology of Mediterranean rock art and were studied by both Breuil and Cabré (Breuil and Burkitt 1915; García del Toro 1986). Some figures at this site are principal examples of Fortea's "Linear-Geometric" style art (Fortea 1975; see also Alonso Tejada and Grimal 2005*a*:47). Despite this history there has been little recent comprehensive study of these sites (but see Hernández Pérez 1986); Alonso and Grimal have presented updated

(a) Cantos de la Visera

(b) View of Monte Arabí

Figure 6.4: Overviews of Monte Arabí and Cantos de la Visera. While Monte Arabí is a very conspicuous landmark, the rock shelters themselves are not very prominent, although their unusual location in large boulders is notable. Shelter I is on the right of the photograph; shelter II is on the left, next to the large tree. Figure a by D. Arsenault; figure b by the author.

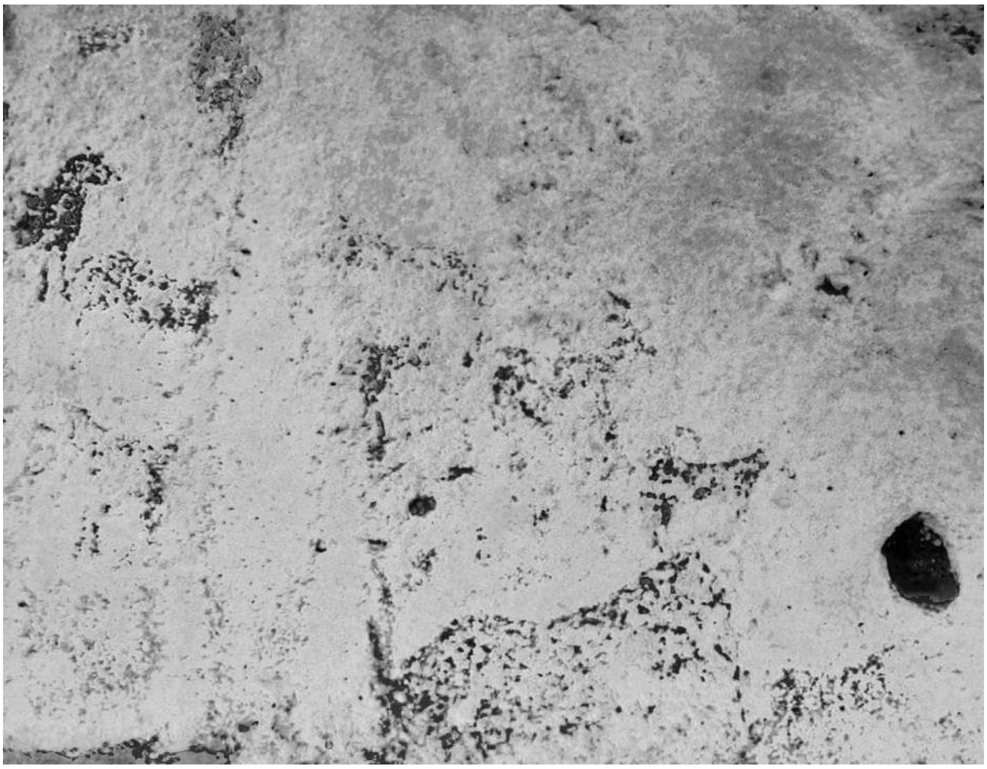


Figure 6.5: Detail of Cantos de la Visera I. The images on this panel are very faint and difficult to show clearly in photographs, even with heavy digital modification. Multiple animal species are depicted on this panel, including the large bull at the bottom centre, smaller bull on the top left, a cervid below the small bull, and a caprid in the top centre portion of the panel. Enhanced from a near-infrared photograph by the author.

tracings of the site[1] (Alonso Tejada and Grimal 2002*b*), but these have not yet been widely published. The paintings at Cantos de la Visera are considered to be a mixture of both the Levantine and Schematic styles, with the addition of the possible Linear-Geometric elements, although as mentioned above this latter style is now generally considered to be a variation of the Macroschematic or Schematic. This site consists of two shelters formed in adjacent hollowed-out boulders (rather than the more typical rock shelter formed in the caprock) on the lower slopes of Monte

[1]Presented at the Congreso Nacional de Arte Rupestre Levantino, held between 7 -- 9 November 2008 in Murcia, as reported by http://www.rupestreguerrero.com/Varios/Congresomurcia.html. A copy of the tracing of Cantos de la Visera II was made available for use during a field visit by staff from the Yecla museum.

Arabí (figure 6.4). While Monte Arabí is a conspicuous landmark from the surrounding area, the rockshelters themselves are not visually prominent from a distance. Many of the motifs are rather difficult to discern, however, they are quite varied in size, colour (including some black motifs), motif type, and style, including some elements in shelter II which are one of the few examples of the so-called Linear-Geometric style (figure 2.2).

Shelter I has two panels, with approximately 28 motifs in both black and red. These appear to be all zoomorphs, and include bulls, caprids, and cervids, as well as 2 amorphous remnants and two groups of branching lines which may also be zoomorphs. Shelter II has a large and complex panel, with multiple episodes of painting and multiple styles. There are approximately 52 motifs, including multiple animal species, anthropomorphs, abstract motifs, and possible idol-like figures. Some motifs have been repainted, and in some cases have been transformed into a different species such as the large animal on the left side of Cantos de la Visera II (figure 6.6), which has withers like a bull and traces of a long tail, but also seems to have antlers.

Figure 6.6: Detail of the left side of the panel, Cantos de la Visera II. Enhanced from a near-infrared photograph by the author.

Figure 6.7: Photograph, Cantos de la Visera II. Detail of bulls, right side of panel. Enhanced from a near-infrared photograph by the author.

Figure 6.8: Central section of panel, Cueva del Mediodía. Photograph by the author.

Cueva del Mediodía (figure 6.8) is located just below the top of a ridge on the side of Monte Arabi, in a wide, shallow rock shelter. The shelter is easily visible from the slope below, and has a wide view. There is a single panel of images here, consisting of Schematic style elements including possible phi-like figures, a zoomorph, several unusual curvilinear grid-like figures, a possible anthropomorph, and zigzag lines. Although the images are considered to be Schematic they are rather different when compared to other sites in the study area, particularly the curvilinear motifs.

6.1.3 Canto Blanco

The sites of Canto Blanco, Collado de la Hermana, Barranco del Junco (I and II), Gargantones, and Cueva del Monje (II and III) have fewer motifs than the other sites in this area, although their presence is an important indicator of the extent to which this area was used. This quality may also explain why many of them were not found until the recent emphasis on survey research, as noted above. Canto Blanco, discovered in 1983 (Hernández Carrión 1993*a*,*b*) is a rock shelter located in the eastern end of the Sierra del Molar mountain range, very close to Jumilla. The shelter is long but shallow, located at the head of a side canyon. The paintings occupy a single panel in the right-hand third of the shelter. These images consist of a poorly preserved quadruped (see figure 5.2, page 104) and several remnants of other figures. The quadruped is apparently Levantine style, but of an uncertain species; it seems to have been repainted several times with differing colours of paint (orange and red) now evident (Hernández Carrión 1993*b*:115). Hernández notes that the motif may have been changed from one type of animal to another, with features which suggest a deer with elaborate antlers as well as a possible human figure. The second image is a remnant which may represent the antlers of a Schematic style cervid (Hernández Carrión 1993*b*:115).

6.1.4 Collado de la Hermana

Collado de la Hermana is a shallow shelter, located at the base of a low cliff. Two very poorly preserved remnants of figures are located on a panel 1.5m above the ground surface. They appear to be Schematic anthropomorphs (Hernández Carrión and Gil González 1998), but they are too poorly preserved to classify further (figure 6.9). The general site location is easily visible and has a good viewshed; however, the shelter itself is not a prominent visual feature. The site is very close to Cueva del Monje II and III, and the ridge on which these sites are located is visible although the shelters themselves are not.

Figure 6.9: Remnants of Schematic anthropomorph and an unidentified motif, Collado de la Hermana. Enhanced photograph by the author.

6.1.5 Barranco del Junco I and II

Barranco del Junco consists of two small shelters less than 50m apart, located on a slope in a side drainage, which were discovered during recent surveys (Alonso Tejada and Grimal 2005*a*). I was unable to locate the panel at Junco I despite multiple visits, however, Alonso Tejada and Grimal describe the panel at Junco I as containing a single apparently Schematic zoomorph, possibly a caprid, and provide an illustration (figure 6.10). Junco II has a panel near the floor with a group of at least six zoomorphs, also probably caprids. These are partially obscured by calcium accretions and are poorly preserved, although they are likewise illustrated. Although the shelters are not strikingly large or unusual in appearance, they are relatively prominent because of their location in outcrops on a slope with few other extant rocky areas. Both sites have a good view of the wider valley below, although the view of the immediate vicinity is somewhat restricted due to the location within the drainage.

(a) Barranco del Junco I **(b)** Barranco del Junco II

Figure 6.10: Drawing of zoomorphs, Barranco del Junco I and II (Alonso Tejada and Grimal 2005*a*:52-53).

6.1.6 Cuevas del Monje (Hermana de Jumilla)

A similar visibility situation is noted for the sites at Cuevas del Monje. In this case both shelters are located near the top of a peak, and are clearly visible, with good viewsheds (figure 6.11). However, there are multiple rock shelters in the same general area, with no readily observable distinctions between them apart from the presence or absence of rock art. The two rock art sites are located to the west of the Epipalaeolithic site of Cuevas del Monje I (Hernández Carrión and Gil González 1998). Monje II, which is accessible with some difficulty, contains two panels in small alcove on the left side. The images are extremely faint, possibly in part because of the large amount of modern graffiti on the walls of the shelter. The identifiable images consist of two Levantine style bulls and a partial anthropomorph which seems to be holding a stick or similar object on panel 1 (Alonso Tejada and Grimal 2005*a*; Hernández Carrión and Gil González 1998), and an animal with no head on panel 2. Alonso has identified a further caprid image (2005*a*:64), however, I was unable to

Figure 6.11: View toward Cuevas del Monje. Note that there are several rock shelters along the ridge, but only two are known to have rock art. Photograph by the author.

positively identify this motif in the field due to the poor state of preservation.

Monje III is located above Monje II in the same vertical rock face, but the difficult access requires climbing gear (Hernández Carrión and Gil González 1998:99). According to Hernández's description, the shelter contains two panels. The first panel, near the entrance, appears to have been densely painted at one time, with remnants of paint across much of the surface. However, the only elements now discernible are a possible deer zoomorph (presumably Levantine style?), which may have been repainted on either end in a manner similar to the element at Canto Blanco, a remnant of a second animal, and a motif described as an "idol figure" (Hernández Carrión and Gil González 1998:99-100). The second panel contained only a remnant of a quadruped.

6.1.7 Gargantones

Gargantones, identified by Alonso Tejada and Grimal (2006*b*), is also a small shelter located in an outcrop on a slope, similar to the Barranco del Junco sites. The rock art consists of three remnants of Levantine style quadrupeds, one of which is a male caprid with large horns, and several Schematic fragments, including a phi-like figure and several lines (Alonso Tejada and Grimal 2005*a*:48). Importantly, on this panel one of

(a) Overview, Gargantones **(b)** View from Gargantones

Figure 6.12: Overview and view from the rock shelter, Gargantones. The rock art panel is located on the outer edge of the ceiling of the shelter, near the centre. The view from Gargantones includes the adjacent valley, but the view of the immediate area is restricted. Photographs by the author.

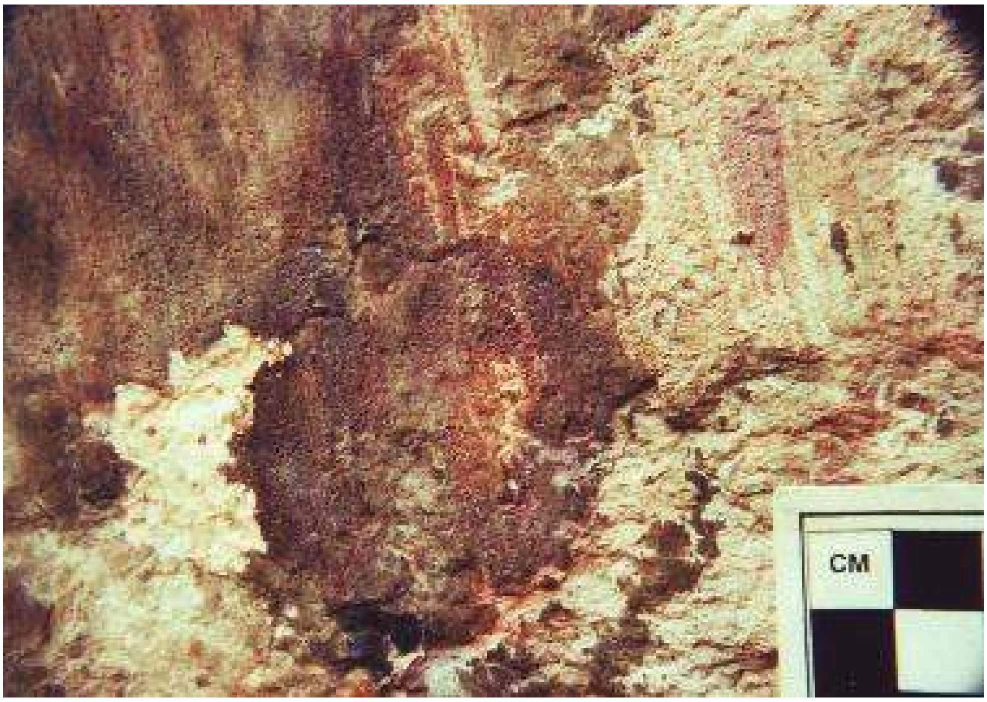


Figure 6.13: Detail of phi-like figure, Gargantones. Note apparent striations, which may indicate that the surface was abraded before painting, and variations in colour. This phi-like figure appears to be superimposed on a Levantine style caprid (Alonso Tejada and Grimal 2006*b*:49). Photograph by the author.

the Levantine style caprids is superimposed by the large phi-like figure and one of the linear motifs (Alonso Tejada and Grimal 2006*b*:49). Due to the poor preservation it is difficult to see this detail; however, the differences in colour are apparent (see figure 6.13). The surface on which the images are painted seems to have been prepared by abrasion before painting, as evidenced by diagonal marks which slope up to the left (figure 6.13). Small areas of missing paint may be due to the images having been pecked after painting. The image are located near the centre of the shelter, outside and above the cavity itself, approximately 1.5 m above the floor (figure 6.12a). The view from the shelter is restricted with respect to the area surrounding the shelter itself, due to the shape of the shelter and its position within the valley, but at the same time there is a good view to the adjacent valley, which is framed by the other side of the drainage (see overview, figure 6.12b). This location is also similar to Cuevas del Monje and Collado de la Hermana, in that several other small shelters are visible in small outcrops dotting the slope, but Alonso Tejada and Grimal (2006*b*) and my own investigations did not find any other rock art in this location.

6.1.8 Solana de la Pedrera

Solana de la Pedrera, discovered in 1998 (Hernández Carrión and Gil González 1998), is a small, shallow rock shelter, located near the top of a narrow side canyon wall. Visibility of the site is restricted depending on the location of the viewer. From below, the shelter and the images are not visible. Rather, it is necessary to scramble up a rock face in order to reach the paintings. The shelter is visible from nearby higher ground, however, and it is possible to see much of the surrounding territory from the location of the paintings. The rock art in this site is entirely Schematic, consisting of three zoomorphs, at least one stick figure anthropomorph, and three phi-like figures. It has been suggested that the three phi-like figures represent a phallic male flanked by two females wearing skirts (Hernández Carrión and Gil González 1998:101); however, closer examination of the images with the aid of digital enhancement of the photographs leaves this impression in doubt (see figure 6.14). All three phi-like figures do seem to have defined heads or headdresses and possible legs, however, which marks these images as atypical phi-like figures.

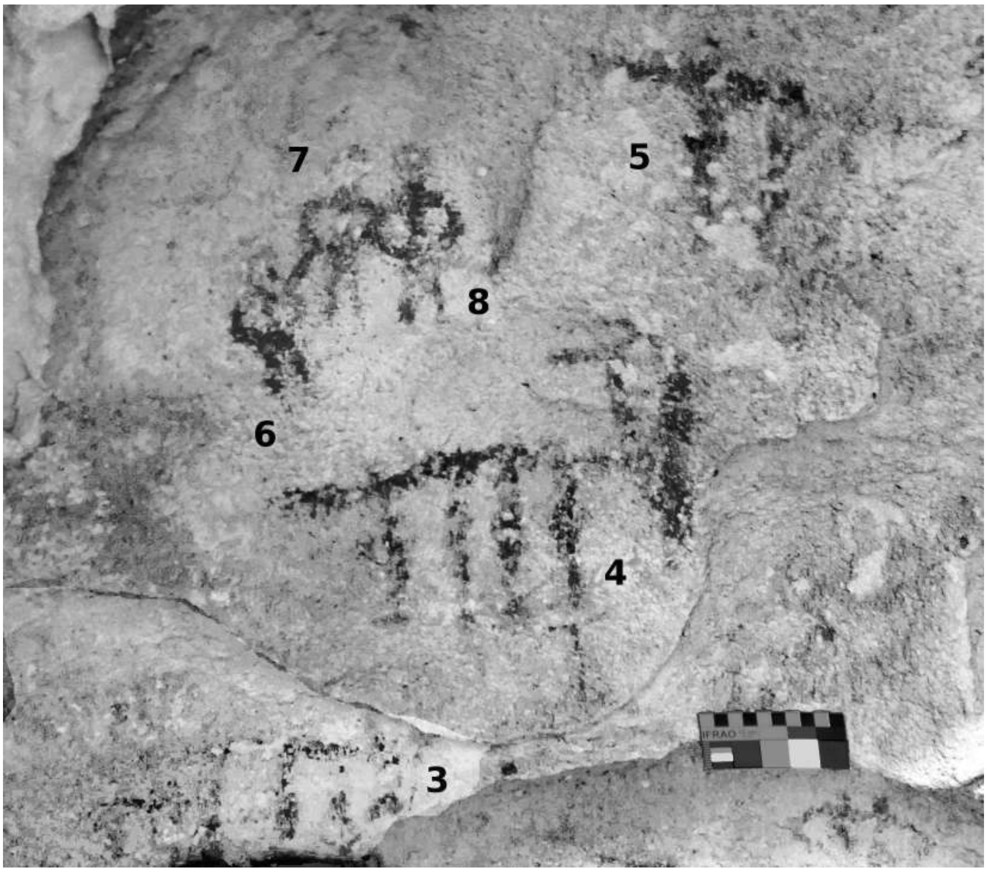


Figure 6.14: Detail of central figures, La Pedrera. Numbers are my scheme. The three phi-like figures (numbers 6, 7, and 8) have been suggested to represent a phallic male flanked by two women wearing skirts (Hernández Carrión and Gil González 1998:101. Enhancing the photograph shows that this does not seem to be the case. Enhanced from a photograph by D. Arsenault.

6.1.9 Peliciego (Morceguillos)

The site of Peliciego (also known as Morceguillos) was first reported in 1939 (Fernández Avilés 1940; Martínez Abellán and Abellán Carrión 2003), and was later studied by Fortea Pérez (1974*a*:21-22; 26), who produced more detailed records using photographs and tracing with cellophane paper (figure 6.15, see also Alonso Tejada and Grimal 2005*a*:62). Fourteen elements of both Schematic and Levantine style were defined by Fortea (taking into account earlier studies by Beltrán Martínez): one phi-like anthropomorph and two remnants interpreted as the lower halves of anthropomorphs, one Schematic caprid or cervid, one stylized cervid, seven stylized horses, and two red marks (Fortea Pérez

1974*a*:26-31). Beltrán, writing in the introduction to Montes Bernárdez and Salmerón Juan (1998:8), cites Peliciego as an example of the "Semi-Naturalistic"; while later in the text reference is made to the "stylized" Levantine (1998:19). A recent evaluation of the site (Hernández Carrión 2003) found that Fortea's recordings are reasonably accurate, with only minor variations which do not alter the identification of the images. This re-evaluation also found a second panel inside the cave proper, consisting of long wavy and intersecting lines; however, these have not yet been published or described in detail.

The paintings are found on the northeast side of the cave entrance, but not inside the cave proper, which extends for 75 metres into the hill (Fortea Pérez 1974*a*). The cave is located near the top of the mountain known as Alto de los Grajos, which is quite close to Buen Aire although the sites are not inter-visible due to the orientation of Peliciego. The cave location is clearly visible from the surrounding area, and has a correspondingly broad viewshed, although access to the site itself is difficult.

(a) Tracing of the main panel

(b) Overview of the site location

Figure 6.15: Tracing of the main panel of rock art at Peliciego and overview of the general location of the site. The cave is near the top of the peak. Figure a from Martínez Abellán and Abellán Carrión (2003:51); figure b by the author.

6.1.10 Pico de la Tienda I and II

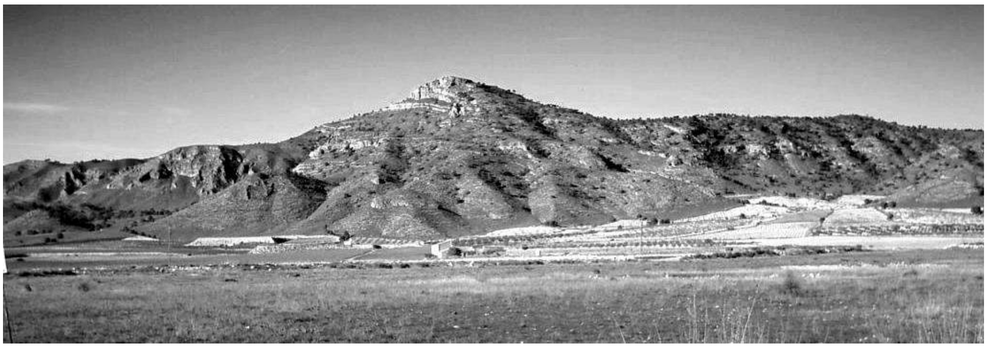
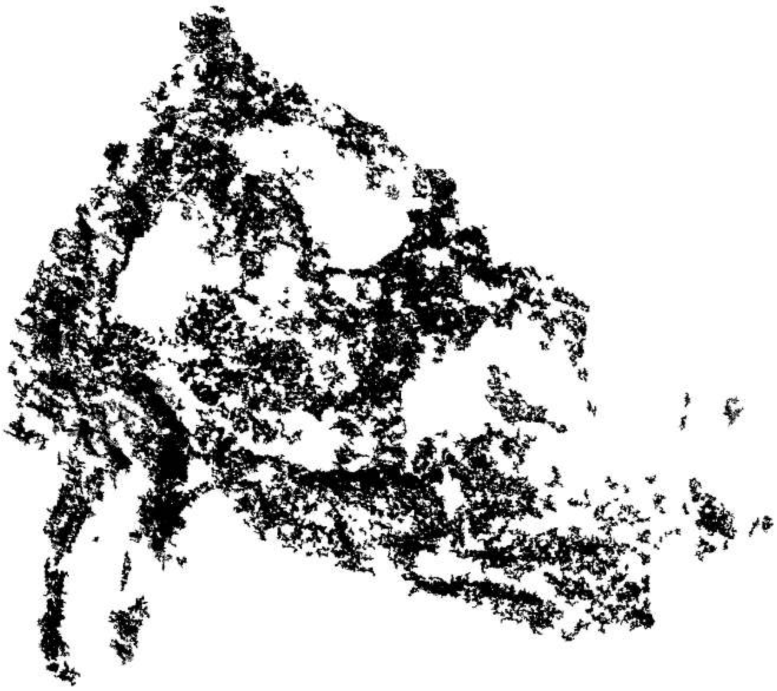


Figure 6.16: Overview of the general location, Pico de la Tienda. Photograph by the author.

The sites of Pico de la Tienda I and II are located near the top of a peak figure 6.16. The peak itself is visible from the valley floor, although the shelters are not associated with any obviously unusual geological features aside from the peak itself. Both sites have extensive viewsheds. However, although the two shelters are adjacent (located approximately 400 meters apart), they are not inter-visible because they are oriented in slightly different directions and are separated by a rise. Shelter I, the westernmost site, is a large, long shelter with approximately 34 identified Levantine style images, some of which seem to be arranged in groups which have been interpreted as dance or ritual scenes (figure figure 6.17), and one hunting scene (Salmerón Juan et al. 1997:198) due to the presence of an archer motif (figure 6.18). Shelter II, the easternmost shelter, is a similar size, however, there is only one panel of images in a small alcove on the western end of the shelter. These images are less well-preserved, however, they portray a similar "dance" theme, including one figure which appears to have long arms and a rayed headdress, much like those at Pico de la Tienda I (figure 6.19).

Figure 6.17: Detail of anthropomorphic figures with headdresses, Pico de la Tienda I. Photograph by the author.



(a) Tracing of the large bull

(b) Enhanced photograph of round-body human and archer motifs

Figure 6.18: Details of motifs at Pico de la Tienda I. Both figures are based on photographs by the author.

Figure 6.19: Detail of central figures, Pico de la Tienda II. Note anthropomorphic figure with apparent raised arms and rayed headdress, top centre. Enhanced from a photograph by the author.

6.2 Vega Alta of the Segura River: Cehegín, Cieza, and Mula

The Vega Alta region is characterized by a somewhat less arid climate when compared to the Altiplano, and today appears to be more wooded. This impression is in part due to the Segura River itself, and the proximity of the rock art sites to the river and to each other. Almadenes Canyon is a particular example of this, as the major group of sites around La Serreta, the site of Los Pucheros, and El Pozo are all located in or near the river canyon. However, other sites in this group are located near the tops of peaks and ridges, and the locations chosen for the creation of rock art are not homogeneous, as was seen in the Altiplano sites. Similarly, the number of motifs depicted at each site in this area is quite varied, and although this is perhaps a factor of preservation in some cases it is also clear that certain locations were originally less densely painted than others. This issue is taken up again in chapter 7.

6.2.1 Almadenes Canyon

Rock art was first identified in Almadenes Canyon with the discovery of La Serreta by a group of speleologists exploring the area (Sánchez et al. 1972 - 1973; Valenzuela 1972 - 1973). All of the sites are located near the rim of the canyon, quite high above the Segura River (figure 6.26a); many of the sites within the group are inter-visible. In this area the canyon is quite narrow with relatively sheer walls, and climbing gear or safety ropes are needed to access most of the sites (Salmerón Juan et al. 2000:694). Although most of the sites are today very difficult to reach, the density of occupation and the frequent re-use over time suggests that it may have been easier to reach these sites in the past. This impression is supported by the presence of large blocks of rock in the bottom of the canyon which seem to fit the shape of the sites (especially at Rumíes), which may have been dislodged due to the use of dynamite in the construction of a power plant in the 1920s (Salmerón Juan et al. 2000:698-699), or perhaps due to earthquakes, which are not uncommon in the region (see the discussion of the Peña Rubia sites, page 156, for example). However, accessing the sites would nonetheless have been risky, given the sheer nature of the canyon walls and the long drop to the river below. Salmerón Juan et al. do not note whether the research project included a systematic assessment of the canyon walls for additional geological evidence of ledges in the past. The exception is La Serreta, which has been developed for tourist access.

During the course of this development work, excavations were carried out inside La Serreta and several rock shelters in the surrounding canyon were investigated for the presence of rock art. As a result of this research, there are currently seven sites with identifiable post-Palaeolithic rock art in the Almadenes Canyon group: La Serreta, Enredaderas, El Paso I and II, Abrigo de los Rumíes, Cueva de Las Cabras, and Cueva del Laberinto. Other sites in the area exhibit remnants of paintings which cannot be classified (El Greco I and II, Cueva de Pilar, Cueva del Miedo, Cueva del Niño, and Diaclasa de Higuera), Palaeolithic images (El Arco I, II, and III, Cueva de Jorge, and Las Cabras), and mediaeval and modern writing (Los Rumíes and Las Cruces, Salmerón Juan et al. 2000:695). Only the sites with post-Palaeolithic rock art are analysed here, but this diversity and longevity of imagery supports the impression that the sites in this group had a related function and remained important over time, possibly because of the unusually humid environment in and around the canyon (Salmerón Juan et al. 2000:694). Some further sites of interest were noted during the 1995 survey and recording project, although the work team was not able to visit and asses them (Salmerón Juan et al. 1995; Salmerón Juan et al. 2000). It is probable that there are yet more examples of both occupation and rock art to be found within the Almadenes canyon area. There is relatively little published information available about the other sites in the canyon, aside from the observations made when the sites were discovered during the excavation work at La Serreta and the subsequent re-evaluation project (Montes Bernárdez and Salmerón Juan 1998:44-45; Salmerón Juan et al. 1995; Salmerón Juan et al. 2000).

La Serreta

La Serreta, discovered in 1973 (Mateo Saura 1993) is the largest and most complex site in this group, with two panels of images including some unusual motifs. The cave is accessed from the canyon rim by a natural shaft, today enhanced with iron stairs, but the main cave opening is in a sheer cliff face in the Almadenes canyon. As noted above, excavations

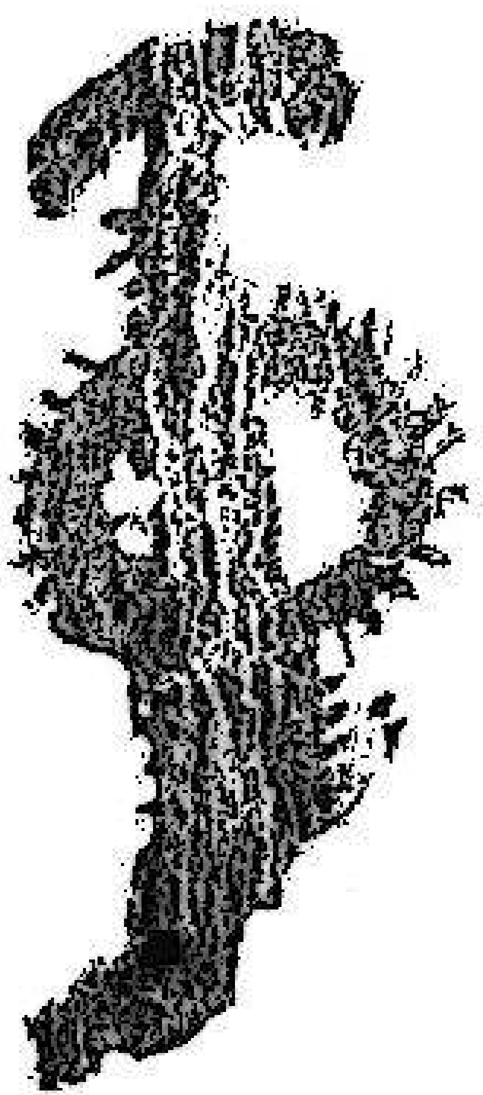


Figure 6.20: "Idol" figure, Panel 2, La Serreta. In a strictly formal sense this motif is a phi-like anthropomorph. However, it has several unusual features for this type of motif: rayed lines surrounding the figure, an apparent headdress, and it appears to be emerging from a natural step in the rock face. Tracing from a photograph by the author.

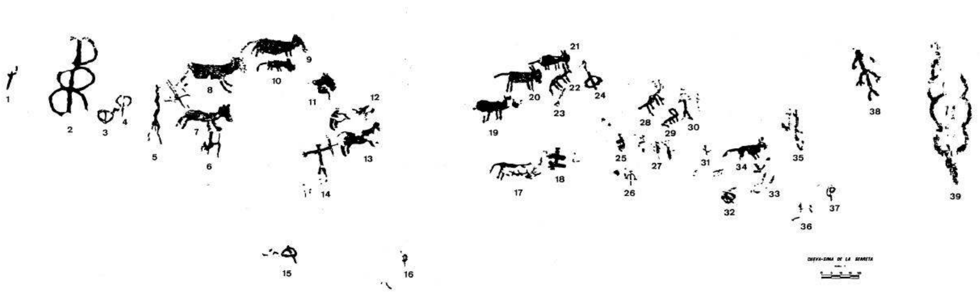


Figure 6.21: Drawing of Panel I, La Serreta (Mateo Saura 1993:30).

Figure 6.22: Detail, Panel I, La Serreta. Photograph by the author.

revealed several occupation episodes, especially the Neolithic (Martínez Sánchez 1994). It is noteworthy that this includes remains from the manufacture of stone bracelets, given the archer on panel 1 which also appears to be wearing bracelets (figure 6.21). The imagery is generally considered to be Semi-Naturalistic or Schematic in style (Montes Bernárdez and Salmerón Juan 1998:39), although there is some debate on this matter, particularly since the detailed nature of the images suggests they are more similar to the Levantine style (see discussion, Mateo Saura 1993:31). Salmeron Juán (1999) describes several of the motifs as Semi-Naturalistic as well as "pure" schematic (for example,

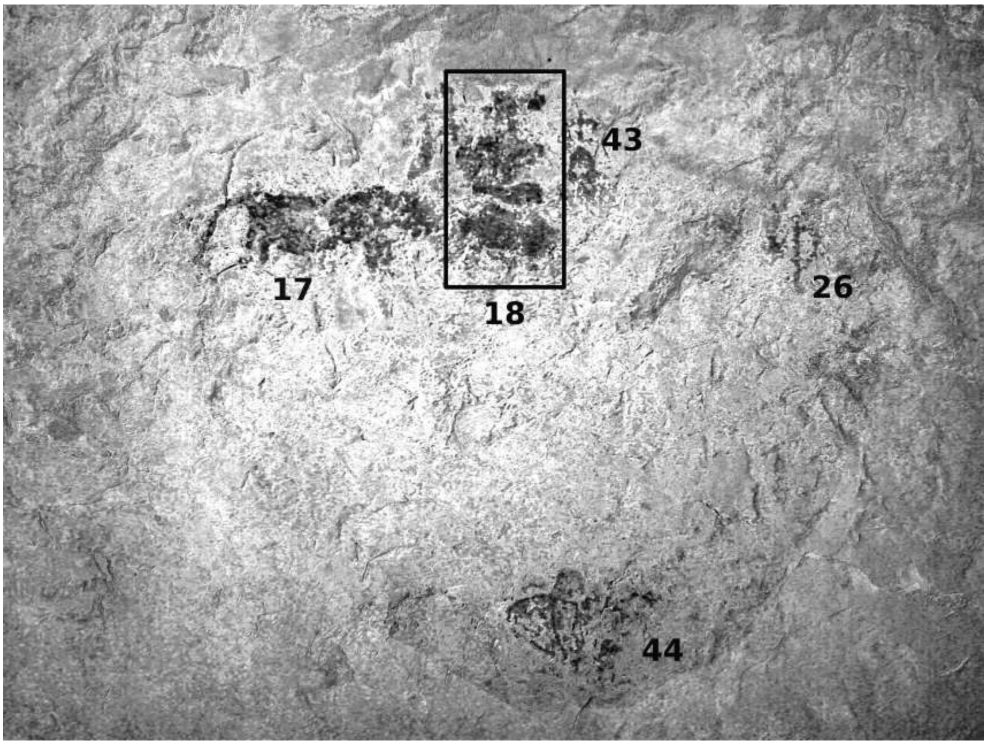


Figure 6.23: Detail of Panel I, La Serreta, showing newly identified motifs (numbers 43 and 44). The area inside the square is identified as a possible anthropomorph in Mateo's tracing (see figure 6.21); however, closer inspection reveals several possible motifs. Enhanced photograph by the author.

quadruped number 22 on panel 1). Panel 1 (figure 6.22), located in the lower chamber, near the opening above the canyon is the most extensive, with at least 50 figures. Some images are not very well preserved and are difficult to identify. Most of the figures are animals (interpreted as horses by Mateo, 1993), phi-like and poly-lobed figures, and anthropomorphs. Although the paintings at this site have been described by several authors (for example, Mateo Saura 1991-92, 1993, 1994; Salmeron Juán 1993, 1999), three motifs which do not seem to have been described in these works were identified during field work (figure 6.23), and some additional details were noted in other motifs. Motif number 42 in my numbering is an area of amorphous pigment on the left side of the archer, number 14. Motif 43 is an anthropomorph with defined fingers and toes, adjacent to motif number 18 in Mateo's scheme (figure 6.21). Motif number 44 is an inverted tear drop shaped motif, bisected by a vertical line filled with several slanted lines, which does not seem to have been recognized in these publications (though this may be the "pectiniform" mentioned by Alonso Tejada 1999:73). Unfortunately these motifs were only revealed during processing and analysis of the photographs and it has not yet been possible to revisit the site to verify the details. However, given the success noted by Díaz-Andreu et al. (forthcoming *a*) using similar methods to reveal motifs at Los Cuchillos which are not otherwise visible, this identification is reasonably secure. Motif number 18 is identified as a "looped arm" (*brazos en asa*) anthropomorph by Mateo Saura (1993) and a cruciform anthropomorph by Salmeron Juán (1999:179); however, enhancement of the photograph suggests that there may be other motifs in this area as well. Motif number 1, the phi-like motif on the left side of the panel, appears to have only one vertical line in Mateo's drawing; however, inspection in the field demonstrated that this motif in fact has two vertical lines bisecting the circle (figure 6.24).

Panel 2 is located quite high on the wall on the opposite side of the cave, above the stone structure. The central element on this panel is the "idol" (figure 6.20), a large phi-like figure with a bristled or "rayed" appearance and a possible headdress, unusual features which tie it to other rock art elements and artefacts elsewhere that have been interpreted as "idols". This element also seems to emerge from a step in

Figure 6.24: Detail of panel I, La Serreta. Note the phi-like figure on the far left (motif number 1); this figure is shown as having one vertical line in Mateo's tracing (see figure 6.21); however, inspection in the field revealed that there are two vertical lines. Enhanced photograph by the author.

the rock. There are at least three, possibly four, other anthropomorphs on the panel below the idol figure, as well as two poly-lobed elements.

Las Enredaderas

Figure 6.25: Schematic "idol" or ramiform motif, Enredaderas. Digital tracing by the author, based on a photograph from Región de Murcia Digital (2004).

Las Enredaderas, discovered in 1981 (Salmeron Juán and Teruel 1990:143; Salmerón Juan 1986-87:223), is located opposite La Serreta in Almadenes Canyon (figure 6.26b). Due to the necessity of using climbing gear to reach the site, it was not visited in person; however, because it is clearly visible from La Serreta some information about the location could be recorded. The site consists of five adjoining rock shelters or caves, with some surface finds suggesting Neolithic and Eneolithic use of the site (Montes Bernárdez and Salmerón Juan 1998:44). Three of these shelters (I, II, and III) were initially reported to contain paintings (Salmerón Juan 1986-87:223), with a fourth (shelter VI) mentioned in Montes Bernárdez and Salmerón Juan (1998:44). The paintings in the first three cavities are exclusively Schematic in style and consist of bars, "ocular idol" motifs, phi-like figures, zoomorphs, ramiforms and other geometric motifs, and amorphous areas including one with both black and red paint (Salmeron Juán and Teruel 1990:143). The presence of idol, ramiform, and star-like motifs has been interpreted as a clear indication of a religious use of the cave (Salmeron Juán and Teruel 1990:143). The style of the paintings in the fourth shelter was not positively identified, but they include human and other figures. At least one figure appears similar to the "ocular idol" motifs found on ceramics and carved bone objects (del Rincón 2002:314; see also figure 3.3, page 58).

El Paso, El Laberinto, Las Cabras, and Los Rumíes

The other sites in Almadenes Canyon which contain identifiable post-Palaeolithic rock art are El Paso I and II, El Laberinto, and Los Rumíes. As noted above, there are other sites which contain remnants of paintings within the canyon; however, these remnants were too fragmentary to be classified (Salmerón Juan et al. 1995). In addition, these smaller sites are less well published than La Serreta or Enredaderas, and no photographs of the paintings could be located in literature searches, although the rock art is described in several publications (see, for example Montes Bernárdez and Salmerón Juan

(a) Segura River from La Serreta **(b)** Enredaderas, as seen from La Serreta

Figure 6.26: General views from La Serreta. Figure 6.26a is the view looking down to the Segura River below the site. Figure 6.26b is the view of Las Enredaderas, on the opposite side of the canyon. Photographs by the author.

1998; Salmerón Juan et al. 1995; Salmerón Juan et al. 2000). The following discussion is mainly drawn from the descriptions in these publications, supplemented with my own observations about the area based on those sites which are visible from La Serreta. As noted in chapter 3, surface finds of Neolithic and Eneolithic incised and impressed ceramics were noted at El Paso, El Laberinto, and Los Rumíes (Montes Bernárdez and Salmerón Juan 1998:45; Salmerón Juan et al. 2000:694-699), as well as historic inscriptions and ceramics at Los Rumíes.

El Paso consists of an overhang divided into two alcoves, located approximately 20 meters below the top of the canyon. In the past it may have been more readily accessible via a ledge that has since fallen (Salmerón Juan et al. 2000:694-695). Salmerón Juan et al. describe shelter I, on the south side, as containing two semi-circular lines, three areas of remnants, and one diagonal line. Shelter II contains 14 elements, including one schematic anthropomorph. El Laberinto is located approximately 10 meters below the rim of the canyon, just to the south of La Serreta, and probably was connected by a ledge in the past (Salmerón Juan et al. 2000:698) although it is no longer accessible without climbing gear due to the height above the river. Near the entrance to the cave there are several lines which appear to be remnants of post-Palaeolithic rock art, but these are too deteriorated to classify. In a niche in the back of the cave a small "idol" figure, consisting of a phi-like figure with three horizontal lines on top, branching out on either side; and a poly-lobed figure were identified (figure 6.27).

Rumíes is located approximately 40 meters below El Paso, and is again in a difficult location. During the re-evaluation work, it was necessary to dangle on a rope and catch hold of a convenient fig tree growing in the entrance in order to reach the cave interior (Salmerón Juan et al. 2000:696). The shelter is divided into three areas: a separate alcove, an open panel nearly on the canyon wall itself, and a separate chamber. In the first alcove there is an element described as a "magnificent" anthropomorph, apparently with a headdress and outstretched arms, and seeming to hold an object in the left arm. The figure is surrounded by several other lines and remnants, especially on the left side (figure 6.28). The second panel seems to contain a poly-lobed

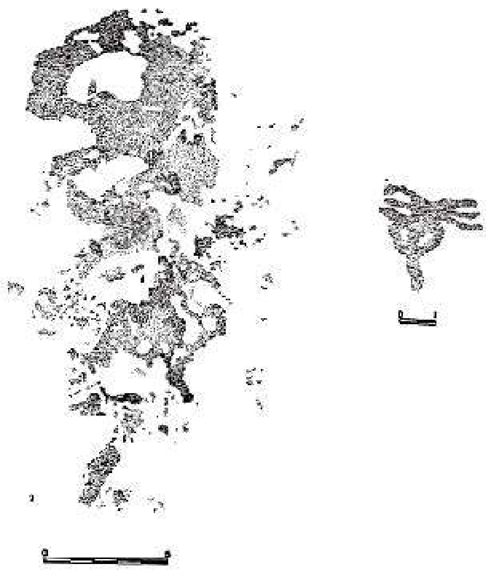


Figure 6.27: Poly-lobed and phi-like figures, El Laberinto (Salmerón Juan et al. 2000:699).

figure consisting of four circular lines with possible feet; however, this element was not illustrated. In the separate chamber several circular areas were found; due to the colour and shape it was suggested that these may actually be Palaeolithic although this has not been confirmed (Salmerón Juan et al. 2000:698). Unfortunately it was not possible for the team to photograph this motif, due to the difficulty of taking appropriate photographic equipment into the site.

The site of Las Cabras is better known for its Palaeolithic motifs; however, it contains remnants of other paintings. Unfortunately these paintings have been damaged by erosion as well as quarrying activity, but one surviving figure is described as Schematic style anthropomorph, painted with thick red lines (Montes Bernárdez and Salmerón Juan 1998:31-33). However, Montes Bernárdez and Salmerón Juan do not illustrate the figure, and there is no further description of it. Due to the location of these sites within the canyon, they can all be characterized as having similarly difficult access and limited visibility and viewshed, except in the sense that the sites are often visible from other sites in the canyon.

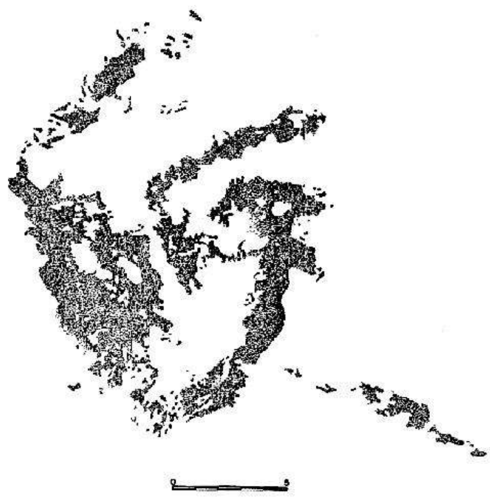


Figure 6.28: "Magnificent" anthropomorph, Los Rumíes (Salmerón Juan et al. 2000:697).

6.2.2 Los Pucheros (Losares Canyon)

The cave site of Los Pucheros (Salmeron Juán and Lomba Maurandi 1995) also has a limited range of motifs. This site is not in the Almadenes Canyon itself; rather, it is located in the nearby Losares Canyon on a slope above the Segura River, near its confluence with the Quípar River (Montes Bernárdez et al. 1999:6). This site contains a single Levantine style caprid and an amorphous remnant of pigment (Montes Bernárdez

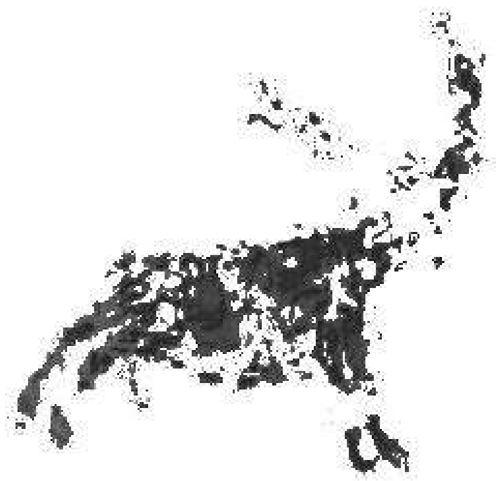


Figure 6.29: Digital tracing of the caprid motif at Los Pucheros. Traced from a photograph by Murcia Turistica[2].

et al. 1990, figure 6.29). The body appears to have been repainted or filled with stripes of a different colour, which Montes Bernárdez and Salmerón Juan (1998:43) suggest may be an indication of the age of the animal, or possibly implies that the image belong to a phase between the Palaeolithic and Levantine. The presence of other Palaeolithic paintings in the vicinity strengthens this possible association. However, other Levantine motifs in the study area, especially the possible boars at Los Grajos I, have similar stripes within the bodies, as does the "female" anthropomorph at El Milano, or further afield, the cervids at La Sarga, for example (Hernández Pérez and Segura Martí 2002).

6.2.3 Los Cuchillos

Los Cuchillos, discovered in 1995, consists of two panels on a nearly sheer rock face on the peak known as Atalaya, overlooking the city of Cieza. The site is atypical in that the paintings are not found within a rock shelter or cave, rather, they are on a relatively flat surface located immediately above a very steep slope. The general site location is inter-visible with Los Grajos, in that the mouth of the canyon in which the former is located can

(a) View from Los Cuchillos **(b)** View from Los Grajos

Figure 6.30: General views from Los Cuchillos and Los Grajos. Figure 6.30a is the view from Los Cuchillos, looking toward Cieza and Los Grajos. The black circle indicates the approximate location of Los Grajos. Figure 6.30b is the view from outside Los Grajos III. Los Cuchillos is on the closest peak, framed by the centre of the valley. Photographs by the author.

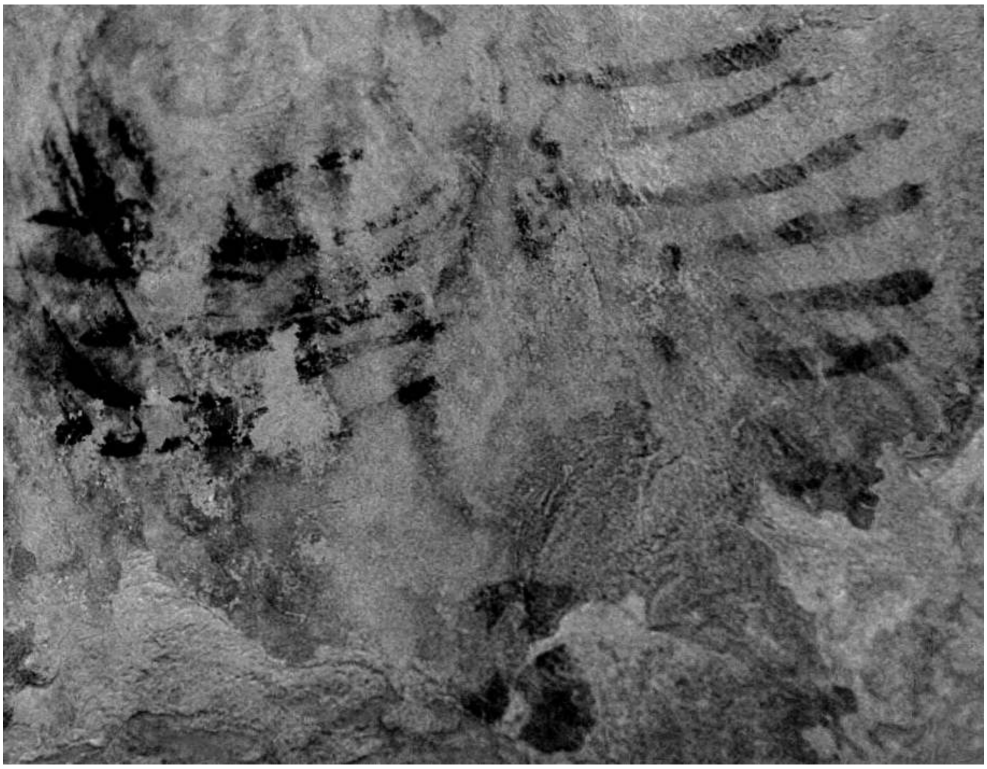


Figure 6.31: Example of a ramiform motif, Los Cuchillos. Enhanced photograph by the author.

be seen from Los Cuchillos (figure 6.30a), and the formation of Los Cuchillos itself can be seen from Los Grajos (figure 6.30b). The site was was originally thought to consist of one panel with approximately thirteen ramiforms or branching lines (Montes Bernárdez and Salmerón Juan 1998:44); however, recent work has found that there are actually forty elements on the main panel (Díaz-Andreu et al. forthcoming *a*), and a second panel containing three additional elements was identified during a field visit in October 2010 (with M. Díaz-Andreu, E. Hernández, and D. Arsenault). As identified by Díaz-Andreu et al., the main panel at Los Cuchillos consists mainly of different types of ramiform motifs (figure 6.31), with a few linear remnants, phi-like figures, and one possible zoomorph. The second panel seems to contain an anthropomorph in addition to some other linear remnants (figure 6.32). As noted in chapter 2, the ramiform motifs echo artefacts found in Chalcolithic contexts, although the presence of the phi-like motif suggests a possible longer chronology for use of the site (Díaz-Andreu et al. forthcoming *b*:10).

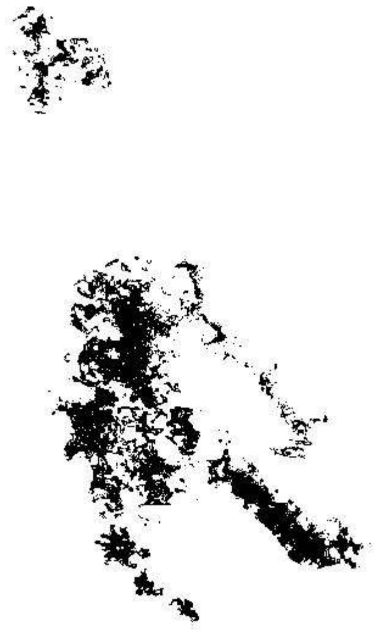


Figure 6.32: Digital tracing of a possible anthropomorph, Los Cuchillos, panel 2. Traced from a photograph by the author.

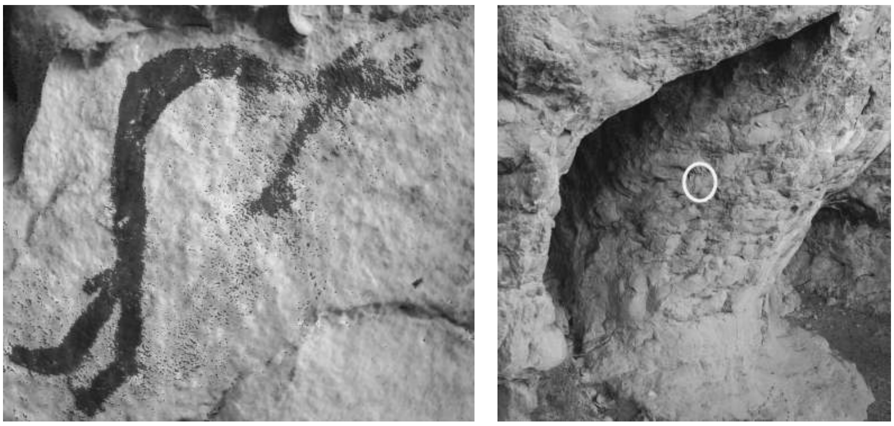
6.2.4 Los Grajos

Los Grajos consists of three separate shelters or caves within the same small canyon. The canyon, while shallow, is located in an upland area and oriented in such a way as to obscure visibility of the surrounding area from inside the caves, although more distant mountains can be seen, including the site of Los Cuchillos (see figure 6.30b). Shelters I and II, which are adjacent to each other near the mouth of the canyon, were discovered in 1962 (Beltrán Martínez 1969:5) and have been discussed in several publications (Beltrán Martínez 1969, 1970*a*; Lomba Maurandi et al. 2000; Martínez Andreu 1995; Montes Bernárdez 1991, 1995). Los Grajos III, which was discovered in 1995 (Montes Bernárdez and Salmerón Juan 1998:40) is located some distance away at the head of the canyon, and has not been as intensively studied. Additional archaeological materials have been identified in excavations at both Shelter II and III, and span a wide chronological range. Although the materials excavated

Figure 6.33: Panel 1, Los Grajos I. Enhanced photograph by the author. Numbers follow Beltrán's (1970*a*) scheme except number 51, which was not identified in Beltrán's work.

suggest a long history of occupation, the rock art in all three shelters appears to be post-Palaeolithic or later, including some images in shelter II which seem to be Roman or mediaeval (Beltrán Martínez 1969).

Los Grajos I contains two panels dominated by Levantine style images in alcoves on either side of the entrance to the cave. The largest



(a) Isolated anthropomorph, Los Grajos II

(b) Location of anthropomorph in side chamber

Figure 6.34: Detail of the isolated anthropomorph, Los Grajos II (panel 1) and an overview of the small side chamber in which it is located. The constrained space echoes the contorted posture of the anthropomorph. Enhanced photographs by the author.

panel contains 54 figures in a scene which is generally interpreted as a ritual dance, and includes several women wearing skirts with their arms above their heads, indeterminate gender or male anthropomorphs in various postures, and several animals including deer, caprids, and possible boars (figure 6.33). There are several instances of repainting and superimpositioning on this panel, implying multiple phases of painting. Unusually, this repainting includes a figure which seems to have been changed from a female to a male (motif 20, figure 6.33). In addition to the Levantine figures there is at least one phi-like figure (number 43). The second panel, located in a small alcove on the opposite side of the shelter, has 4 motifs making up a scene which seems to depict two women chasing a caprid, although two of the motifs are amorphous remnants. Although the cave extends for several meters, no further motifs were identified in the field.

Los Grajos II, located to the north of Los Grajos I, contains two panels of post-Palaeolithic rock art, as well as the Roman or Mediaeval images mentioned above. These latter include a curious anthropomorphic painting, a large black fine-lined figure, and a group of animals with circular hooves and a possible cart. For the purposes of this analysis, these later images have been ignored, although as with the Palaeolithic

Figure 6.35: Photograph of phi-like figures, Los Grajos II. Enhanced photograph by the author.

images in Almadenes Canyon it is interesting to note that the location remained important for a considerable period of time. To facilitate discussion I have assigned my own numbers to the two post-Palaeolithic panels. Panel 1 contains a single anthropomorph, apparently male, which is bent over under a small protrusion in the rock (figure 6.34a). This panel is located within a narrow chamber on the left side of the cave. The chamber is no more than 3m high, 1m wide, and perhaps 1.5m deep; the contorted nature of the anthropomorph may reflect the small space chosen for its location (figure 6.34b). Panel 2 is located to the right of this panel, 50cm above the floor on a sloping section of wall. Five faint phi-like figures are visible on this panel, as well as some other faint remnants of pigment (figure 6.35). An additional small remnant on a panel inside an alcove near the front of the cave was noted during field work, though this was not recorded by Beltrán Martínez (1969).

Los Grajos III is a small shelter with a low ceiling, located at head of the canyon and oriented to the south. The site is accessed via a moderate slope from the either the top or bottom of the canyon, which is quite shallow (approximately 3m) at this point. The view from immediate area around and inside the shelter is quite restricted, although as mentioned the location of Los Cuchillos is clearly visible in the distance when standing outside this shelter (figure 6.30b). Due to the shape of the canyon, however, Los Grajos I and II are not visible, and the view of the surrounding terrain is limited. Although the images at Los Grajos III

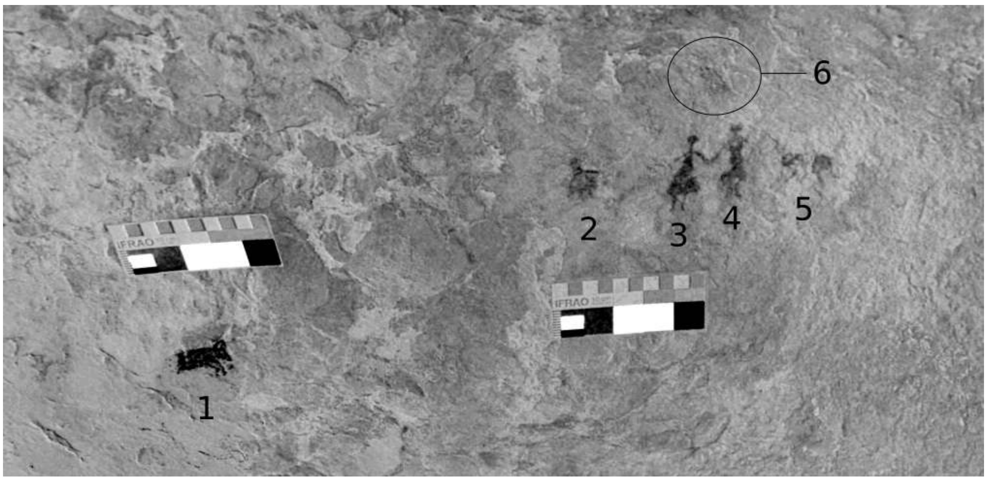


Figure 6.36: Panel 1, Los Grajos III. Enhanced photograph by the author.

(figure 6.36) are similar in style to those at Grajos I and II, they are very small in comparison (the maximum height is 3.5cm), which implies at least a possible difference in function or chronology. The main group consists of three human figures with skirts, two of which are holding hands, a partial zoomorph, and one remnant of paint, which is unidentifiable. A clear caprid is located approximately 30 centimetres to the left of this group. Excavations revealed two levels of occupation, notably a collective burial of Eneolithic date and traces of a more ephemeral Neolithic occupation (Montes Bernárdez and Salmerón Juan 1998:40).

6.2.5 Peña Rubia (Las Conchas, El Humo, Las Palomas)

There are three sites in this area which contain rock art. It was once claimed that the paintings are modern, but pigment analysis has demonstrated their authenticity (Beltrán Martínez et al. 1987; Beltrán Martínez and San Nicolás del Toro 1985; Montes Bernárdez and Salmerón Juan 1998:58). The sites are located in small caves, located in a vertical arrangement along a very steep slope on the side of the mountain known as Peña Rubia (figure 6.37). Although the location of the paintings

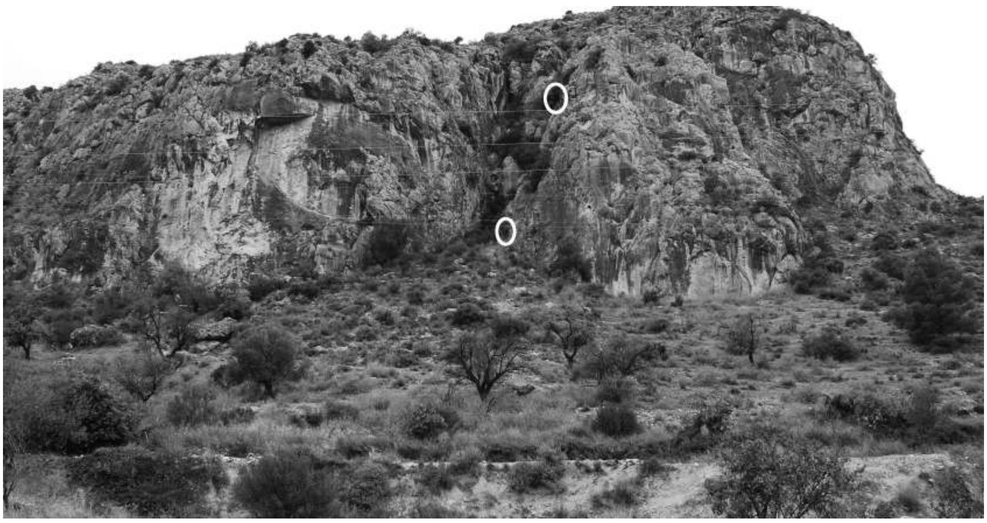


Figure 6.37: Overview of the location of the Peña Rubia sites. White circles indicate the location of the sites visited. Las Conchas, near the bottom, is fairly easy to access, although El Humo, near the top of the cliff, is not. Enhanced photograph by the author.

naturally restricts the viewshed from the perspective of the painted panels themselves, the view from the exterior of the caves is not restricted. The cave entrances are not visually prominent relative to their immediate surroundings, however, the peak of Peña Rubia itself is very distinct and visible. Access to the sites is difficult due to their location on the steep slope. The sites are described in Mateo Saura (1999:154-60) and briefly in Montes Bernárdez and Salmerón Juan (1998:58), and were visited in 2010 except for Las Palomas, which was unfortunately blocked by a small earthquake just prior to this visit. Together with El Milano and Los Grajos III, this area is unusual in that it is one of the few sites where rock art can be directly associated with archaeological remains. Although disturbed by looting, all three Peña Rubia sites have yielded materials associated with Eneolithic burials. The sites are also unusual in that the post-Palaeolithic images are found in the dark zone inside the small caves. The only other site in the study area for which this is true is Peliciego. The paintings are somewhat different stylistically to other naturalistic or Levantine style images in general (Montes Bernárdez and Salmerón Juan 1998:58), and it is unclear whether they should be considered as examples of the Semi- or Sub-Naturalistic styles. However, the sites are quite consistent relative to each other, reinforcing an impression that they were created within a short time span that can be related to the excavated materials.

The paintings at Las Conchas are located approximately 10 metres from the entrance of the cave. This site contains a single panel with three anthropomorphs, two with bows and one with an apparent spear. They appear to be aiming toward a quadruped with a large belly and humped back, which is possibly a bull but impossible to positively identify. El Humo also contains a single panel, which is located on a pendulous rock inside the shallow cave but not quite in the dark zone. The panel has four figures, notably a very "wavy" figure described by Mateo Saura (1999:157) as a female, and an archer adjacent to a quadruped figure which appears to be a cervid, although because the animal appears to have three fletched arrows in its back it is difficult to determine whether the branching lines at the head represent antlers or arrows. As mentioned, Las Palomas was blocked by a falling rock in October 2010; consequently the following description is based on the photographs and drawings published in

Mateo Saura (1999:158-160). This cave is substantially larger than the other Peña Rubia caves, being approximately 20 meters long with two chambers. There are three rock art panels in the second chamber, all within the dark zone of the cave. Panel 1 has at least four anthropomorphs. Mateo describes the first figure as an archer; although it is difficult to see how the vertical line on the right side of the figure differs from figure 1 at Las Conchas. Motif 3 is an anthropomorphic figure which appears to have its hands on its hips, while motif 4 is described by Mateo as a female anthropomorph. However, this description seems questionable based on the irregular nature of the lines which compose the image and the area of pigment below it, which Mateo designates as motif 5 and describes as simply remnants of paint. Unfortunately the description of this panel is accompanied only by a tracing of the panel, and it was not possible to attempt any further digital enhancement which may have clarified the matter. Motif 6 is more clearly recognizable as an archer, due to the prominent arrowhead on the right side of the figure, but it is atypical because the figure does not seem to be standing. It is closely associated with a branching line, which Mateo describes as a possible plant motif but which may also be interpreted as the remnant of a cervid with antlers. Panel 2 has three anthropomorphs, including an archer, which are closely associated with a cervid. Panel 3 can be interpreted as a hunting scene, as it contains an archer which seems to be aiming at a deteriorated quadruped figure.

6.2.6 El Pozo (Monigotes)

El Pozo, also known as Monigotes, has been described in several studies (for example, Mateo Saura 1999; Montes Bernárdez and Salmerón Juan 1998; San Nicolás del Toro 1985). The site is located in the El Esparragal area near Calasparra, at the foot of the Molino mountain range. It consists of a long (more than 20m), large shelter at the bottom of a cliff, just above (1-2m) the present level of the Segura River. Today the site is accessed via a staircase down the cliff face, although it is accessible from the river bank and may have been easier to reach in the past. The images here consist entirely of Sub-Naturalistic or Schematic style motifs (Montes Bernárdez and Salmerón Juan 1998:48), distributed throughout the entire shelter. Mateo (Mateo Saura 1999:161-170) subdivides the site

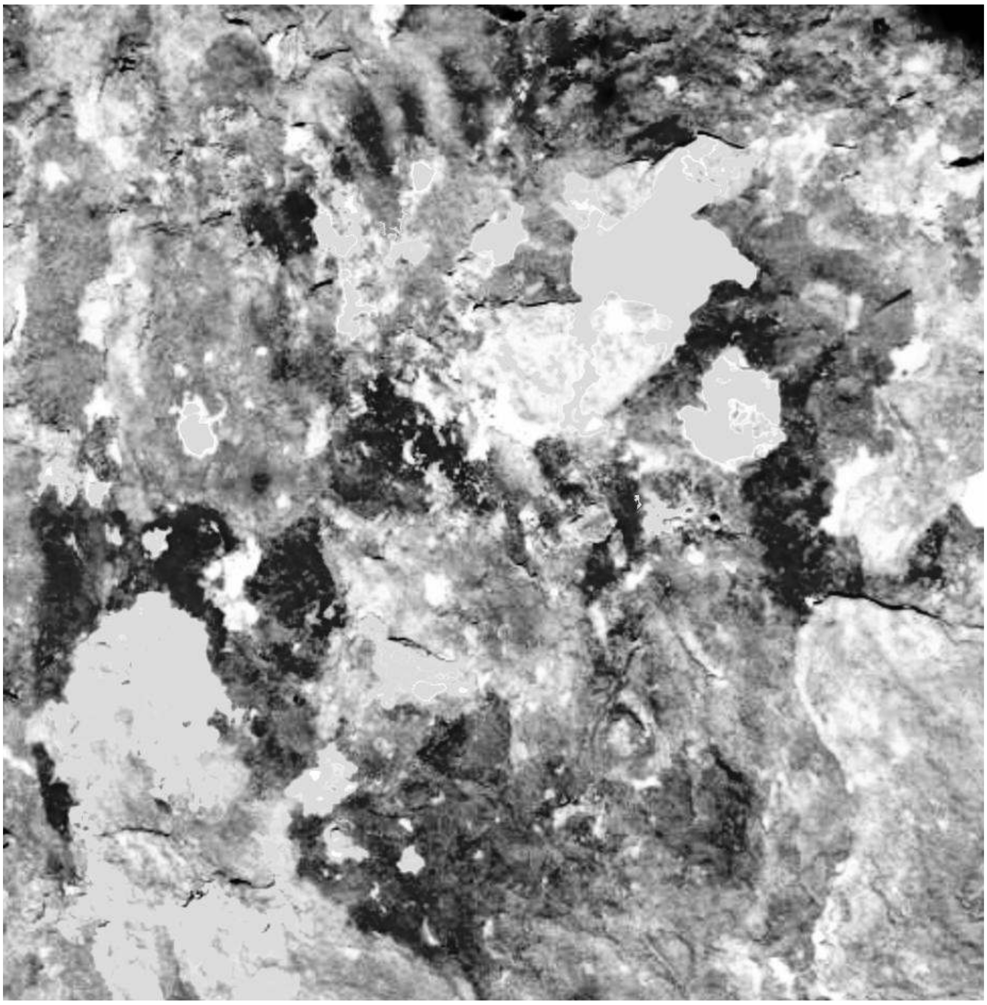


Figure 6.38: Rayed motif, El Pozo. photograph by the author

into four shelters; for convenience I have followed his scheme in my analysis of the site. Shelters I and II contain multiple amorphous remnants, as do panels 3 and 5 in Shelter III. Shelter III, in the deepest part of the site, is divided into eight panels. Panel 1 contains several lines as well as a figure described as a "salamander"; this appears to be anthropomorphic but has long, thin "fingers" and a tail. Three motifs on panel 1 at La Serreta have also been described as "salamanders" (Martínez Sánchez 1994; Mateo Saura 1991-92, 1993); the main feature in common seems to be the long, thin fingers. A similar feature is recorded by Alonso at El Milano, although the rest of the figure has disappeared (San Nicolás del Toro 2009:118). Panel 2 has a group of of phi-like figures,

Figure 6.39: Schematic scene, shelter II, panel 2. El Pozo. Note phi-like and crook motifs. Photograph by the author.

crook-shaped lines, and zoomorphs. Panel 4 includes several animal figures and a series of dots, similar to the arrangement found at Buen Aire II in the Altiplano region. Panel 5 includes a large and unusual rayed figure. Unfortunately, the central part has been removed by a spall, but the remaining series of rays forming an arc is atypical, although it is reminiscent of other rayed motifs such as the "idol" at La Serreta, and has parallels with other comb-like motifs including those at Cantos de la Visera II. Panels 7 and 8 contain a few sparse curvilinear motifs. Shelter IV in Mateo's scheme contains a single motif, a series of short, parallel horizontal bars.

6.2.7 Sierra del Ricote

There are three known sites in the area of the Sierra del Ricote mountain range, north and west of Mula. The sites appear to form a chain along a series of lesser peaks and ridges stretching to the southwest from the main mountain chain. All three sites are on the southern edges of the ridge, and are oriented to the south. Cejo Cortado is the furthest to the north and east. Lomo del Herrero is located approximately 8.26km southwest of this site, and El Milano a further 7.55km in the same direction.

Cejo Cortado

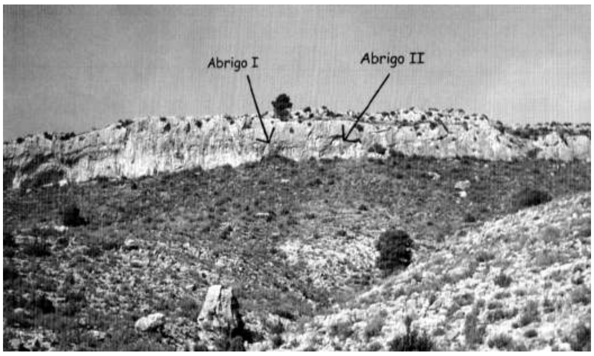
Figure 6.40: Overview, Cejo Cortado. Note that there are multiple rock shelters found together, but only two of them were found to contain paintings. Photograph by the author.

Cejo Cortado, described in Mateo Saura (1999:181-190), was discovered in 1988. The site is near the top of a steep slope with several small rock shelters visible (figure 6.40), although only two have rock art. All of the identifiable motifs are in the Schematic style. A minor

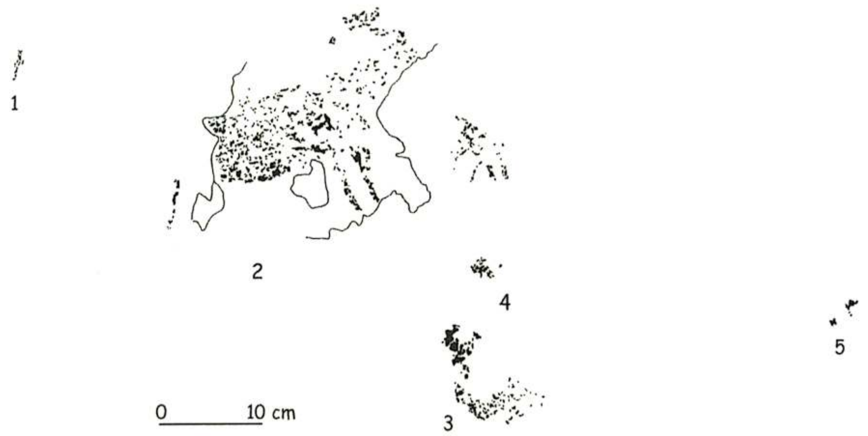
Figure 6.41: Tracing of a possible female figure, Cejo Cortado. This motif was identified as amorphous by Mateo Saura (1999:187), but the triangular shape suggests a long skirt. Digital tracing from a photograph by D. Arsenault.

discrepancy was noted in field visits between Mateo's drawings and the rock art on the ground, in that two elements on panel 2 (9 and 11) seem to be slightly further apart than Mateo's drawings suggest, and a further panel opposite Mateo's panel 7, containing a small vertical mark, was identified. These two variations do not substantially affect the interpretation of site. Further inspection of the rock art also suggests that motif number 23 may in fact represent a female with a long skirt (figure 6.41), although Mateo identifies this as an amorphous area. Shelter I has a total of 28 elements, including the new one which was identified in field work. These include amorphous areas, a fine-lined grid-like motif, stick-figure anthropomorphs, intersecting lines classified as possible anthropomorphs, one phi-like and one poly-lobed figure. Shelter II has 3 amorphous motifs, three lines, and a single zoomorph which appears to be a caprid. The site is quite difficult to access, due to the necessity of scrambling up a rock face immediately below the shelters. Because of its location on the top of the peak, however, the general site location is visible from the surrounding area and has a good view of the terrain below.

Lomo del Herrero



(a) Overview



(b) Detail of shelter I, panel 1

Figure 6.42: Overview of the site location and detail of the rock art at Lomo del Herrero (Mateo Saura and Bernal Monreal 2007).

Lomo del Herrero (figure 6.42) is located on a ridge between Cejo Cortado and El Milano, although the sites are a few miles apart. The site was not visited due to difficult access, but Mateo Saura and Bernal Monreal (2007) have published a description of the site as well as photographs and drawings of the site and its surroundings. The site consists of two small adjacent shelters, both located in the caprock near the top of the ridge. Like other sites, there are several rock shelters in the area, but they do not contain paintings. The paintings are poorly preserved, but shelter I contains nine motifs on two panels, including four amorphous areas, linear and curvilinear remnants, and at least one cervid (motif number 2). The tracing suggests that there may be an additional small quadruped to the right of the cervid; unfortunately this section of the panel was not included in the photograph so this possibility could not be verified. Panel 2 contains an additional possible zoomorph, as well as liner remnants and an amorphous area, while shelter II has a single panel with an unidentifiable curvilinear remnant. As Mateo Saura and Bernal Monreal (2007:58) note, although the images here are not well preserved, their presence extends the known distribution of rock art in the Segura river area, and reinforces the identification of this region as a focus for rock art creation.

El Milano

Figure 6.43: Overview of El Milano, shelter I. Photograph by the author.

El Milano was discovered during surveys in 1985 (San Nicolás del Toro 2009:15), and has been described in several publications (notably Mateo Saura 1999; San Nicolás del Toro 2009). The immediate area around the site is fairly densely wooded, with a restricted visibility,

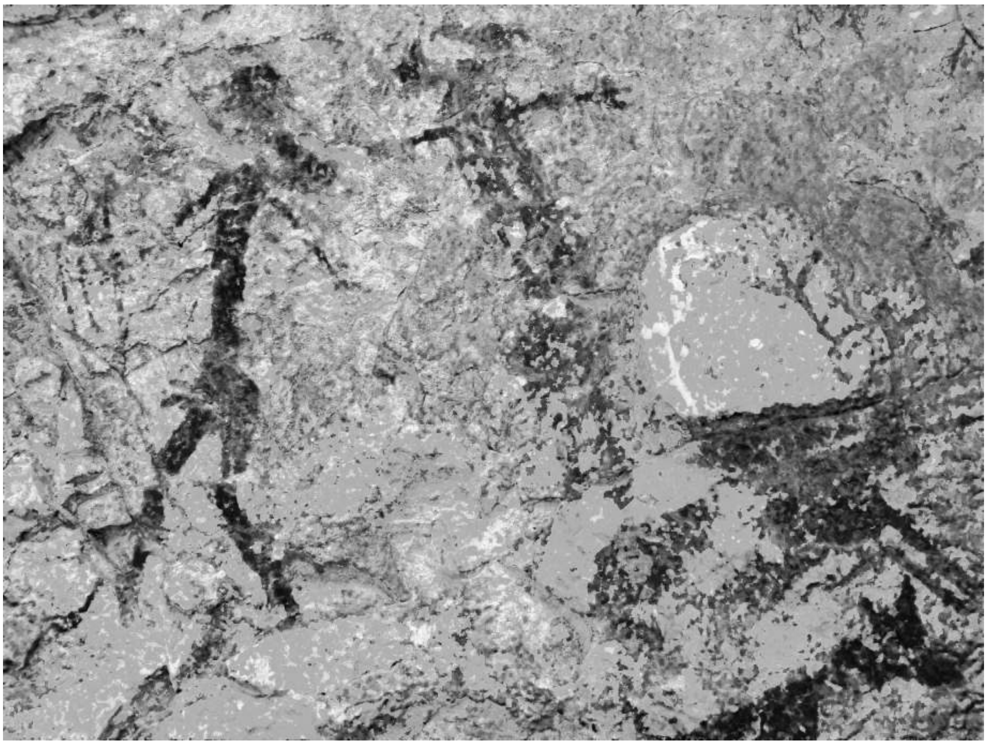


Figure 6.44: Detail of Levantine figures, El Milano, shelter I. Enhanced from a photograph by the author.

although there is a view of more distant areas from inside the main shelter itself. The site is located on a point at one end of a ridge, near the top of the peak. The site consists of two adjacent shelters, both roughly oriented to the south. The westernmost shelter, shelter I, is the largest, and contains two panels of rock art. Shelter II, a few meters to the east, is a large open rock face protected by a shallow overhang, and contained a megalithic stone wall enclosing a collective burial of Neolithic or Eneolithic date (San Nicolás del Toro 2009:11). Alonso has identified some remnants of paint on the wall above the burial (San Nicolás del Toro 2009:120), but these are too faded due to exposure to identify.

The rock art in shelter I is distributed on two separate panels. Panel 1 is located in an alcove near the entrance on the left side of the shelter, approximately 1.5m above the floor, and contains entirely Levantine style images. Several human figures are found on this panel, all apparently wearing triangular headdresses, including an archer and an unusual figure (described as a possible female, figure 6.44) which seems to be filled

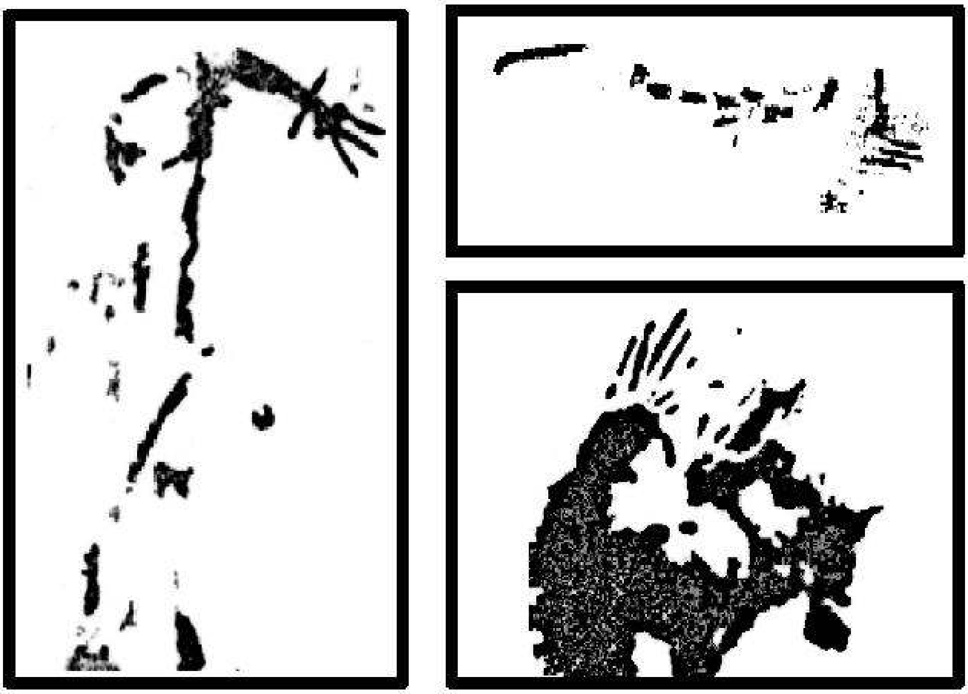


Figure 6.45: Details of amorphous areas which suggest anthropomorph fingers, El Milano, shelter I. Extracts from Alonso's tracings (San Nicolás del Toro 2009:117-118).

in with lines; a deer with branching antlers, a large zoomorph that is most likely a deer but lacks antlers, and several other remnants that appear to be zoomorphs and possible anthropomorphs. Panel 2 consists of the remainder of the shelter beyond this small alcove, and contains mainly Schematic style motifs, although there are some that some may be Semi-Naturalistic or Levantine in style. In particular, motif number 33 in Alonso's recording (San Nicolás del Toro 2009:118) seems to be the remains of an anthropomorph with outstretched fingers and a bracelet, much like the archer figure at La Serreta, while motif number 32 (2009:117) could perhaps be interpreted as the remains of a Levantine style anthropomorph oriented at an angle, particularly the right half of the element which has a similar shape to the defined calves and straight torsos of Levantine style anthropomorphs elsewhere. Better-preserved Schematic images include large phi-like and other bisected figures, possible remains of zoomorphs, a large poly-lobed figure, and several areas of unidentifiable remains. The majority of the images are high on the shelter wall, 1.5-2m above the floor, but are not quite overhead.

There are some significant differences between Mateo's recording (1999:171-175) and Alonso's (2009:103-120). Alonso has identified a total of 38 elements, whereas Mateo has identified 32. The majority of the elements, particularly those that are better-preserved and more readily identifiable, are described in similar terms and show only minor differences in the drawings in each publication. However, Mateo did not include drawings of every element he identified, making it difficult to reconcile the two accounts. Most differences are noted in the description of amorphous or unidentifiable areas of paint, and the element numbers correspond to the same elements up to number 24. In Mateo's recording this is the large poly-lobed element; however, this element is number 26 in Alonso's account. Alonso's elements 24, an unidentifiable figure (possibly the remains of a phi-like figure in my interpretation) and 25, a group of indeterminate remains including four bars and the possible remains of a quadruped, seem not to have been included in Mateo's recording. Mateo's 26 is a short line to the right of the poly-lobed element, which Alonso considers a to be part of the same figure. Mateo identifies three phi-like or anchor-like motifs (25, 28, 29) and a partial circular motif (31), any of which could correspond to Alonso's 23, 24, 27, 35, or 37. In Alonso's recording these elements are described as remnants, although 23 is described as similar to other phi-like figures and this may correspond to Mateo's 25. Alonso groups several distinct areas of paint together in element 37, describing part of this as an anchor-like figure, and it is possible that these are the elements that Mateo has identified as 28 and 29. However, because Mateo does not include illustrations of his elements 23, 25, 27, 28, 30, 31, or 32, this is difficult to verify. In any case it seems clear that many of the elements described by Alonso are not included in Mateo's recording, including the remnants in the shelter with the burial. During field visits I was not able to identify all of the motifs which Alonso recorded, due to the poor preservation of these images. My classification of those motifs is based on Alonso's tracings; however, there are some instances of disagreement, as detailed in the motif description field in appendix A. Key disagreements include a more cautious classification of the two unusual Levantine-style anthropomorphs, which are here described as "possible" women; the features which make up this motif type are analysed in section 5.4. On the other hand, areas described as amorphous remnants but which appear to include features suggestive of human figures (particularly the long "fingers", see figure 6.45) elsewhere in the study area have been classified as possible anthropomorphs and analysed accordingly.

6.3 General observations

The sites in the Altiplano area are diverse in terms of both the thematic content of the rock art and the locations in which they are found. Despite this diversity there are some common features. Many of the sites are small, with only a few motifs of a single style. The sites in this area are mainly found in visible locations with an open view of the surrounding territory, although the size of the rock shelters and the details of their placement differ (that is, some are at the top of peaks while others are on slopes). On the other hand, some of these sites and individual motifs are atypical, particularly the phi-like figures at La Pedrera, the possibly therianthropic images at Pico de la Tienda II, and the very large zoomorphs at Cantos de la Visera. Several sites also exhibit multiple styles on the same panels, with clear evidence of repainting and re-use of the sites. This is not necessarily related to the number of images on the site; on the contrary, Canto Blanco and Gargantones have few motifs as a whole but both have been repainted.

Although it is not true of every site in the Vega Alta region, many of the sites here have more images and seem to be concerned with slightly different themes when compared to the Altiplano sites. The Semi-Naturalistic style images are also found in this area, although it is at times difficult to distinguish between this style and the Levantine or Schematic, as is true of other parts of Mediterranean Spain. However, as with the Altiplano sites, some of the sites in the Vega Alta have a restricted range of motifs, such as Los Cuchillos; very few motifs, such as Los Grajos III and Los Pucheros; or have multiple styles, such as El Milano. One difference, however, is the typical location of the sites here. Although it may be explained simply through an accident of geology, in that the terrain is slightly different in the Vega Alta area, many more of the sites in this group are found in canyons with restricted viewsheds and visibility, are difficult to access, or are located in caves proper rather than shallow rock shelters. These qualities may have some bearing on the differences observed in the rock art in this area, as compared to the Altiplano.

It is also clear that there are many variations in the images which are not fully captured by simply dividing them into Levantine and Schematic styles. The existence of multiple styles or sub-styles, including the possible Linear-Geometric, motifs which are reminiscent of the Macroschematic, as well as sub- or Semi-Naturalistic motifs in itself is evidence that the use of these sites spans multiple time periods, activities, and social identities. Similarly, the physical characteristics of the sites are varied, but it is not obvious how the location in the landscape may have influenced the kinds of images which were created at each site. The characteristics of both the motifs and the interplay between motif type and site location is further explored in chapter 7; however, it is clear from this introductory discussion that these relationships are complex, and can benefit from a more detailed analysis.

Chapter 7

Motif types in context

The purpose of this chapter is to present the analysis of motif types and their relationship with each other and the landscape context in which they are found. First, the characteristics of each motif class are discussed, and the frequency with which different design elements occur within each class is calculated. This information is used to define the motif types which are used in the analyses in the rest of the chapter. The first such analysis is a hierarchical cluster analysis, which is used as an exploratory technique to identify possible structure in the data. This is followed by a cross-tabulation analysis of the motif types which occur together on the same panels. A second aspect of this is the concept of complexity, or the kind and number of motifs which occur together, which is also addressed in this section. Thirdly, the occurrence of motif types is compared to the landscape characteristics identified in chapter 5. Finally, the relationship between type and style is discussed.

7.1 Motif types and frequencies

The goals of this section are to present the motifs found in the study area, describe the attributes which were identified in coding, examine which attributes occur together, and organize the motifs into types on this basis. The combinations of motif attributes and characteristics which were identified during data collection and the ways in which they can be combined to form types is explored. Each basic motif class is described in turn, and the relevant attributes and interrelationships between them is discussed. As discussed previously, there are many possible means of combining motif design elements into types, depending on the goals of the research in question. The purpose of this investigation is to create descriptive types which are sufficiently generic to be applicable to all of the images, but also specific enough to apply to the specific imagery found in the study area.

The types defined here are different from the existing systems in that the overall style designations of Levantine or Schematic style are disregarded, while features in common to both styles are emphasized. The types defined here are not intended to correspond to any particular chronological period; rather, they are intended to facilitate the investigation of some features of the rock art which may indicate a shared importance regardless of style, and which perhaps retained importance through time and cultural change. The frequency with which the design elements or attributes identified during the course of field work and subsequent analysis of the photographs are examined in order to establish which attributes tend to be found together as well as those which are found in multiple motif classes. Particular questions to address include the identification of what patterns constitute gender, which species of animals can be distinguished, and which design elements may be common across motif classes. These latter particularly include wavy lines, rays, and triangular shapes, which could be interpreted as a shared reference to an underlying concept, such as the carved and engraved bone "idols" frequently found in other archaeological sites.

A total of 655 motifs in 41 sites and 65 panels (see table 7.1) were identified during the course of data collection. Motifs are grouped into the basic classes listed below for ease of discussion. There is a wide range of formal variability present in each motif class, though few examples of some variations. Particular attention is paid to anthropomorphs, as they are the most varied class of motif.

- Anthropomorphs: Male, female, archers, indeterminate gender, and uncertain motifs
- Possibly anthropomorphic: Phi-like, ramiform, ancoriform
- Non-representational: Bars, comb-like, lines, grids, dots
- Zoomorphs: Bulls, caprids, cervids, equids, and uncertain motifs

7.1.1 Anthropomorphs

Anthropomorphs are the most diverse class of motifs studied here, and have been the focus of other research in the Mediterranean region (see, for

Table 7.1: Total number of motifs per each site in the Altiplano and Vega Alta of the Segura River areas

Altiplano		Vega Alta	
Buen Aire I (W)	90	Cabras	1
Buen Aire II (E)	15	Cejo Cortado I and II	34
Canto Blanco	2	Conchas (Peña Rubia)	4
Cantos de la Visera I	27	Cuchillos	43
Cantos de la Visera II	55	Enredaderas I, II, and IV	10
Collado de las Hermanas	2	Grajos I	52
Gargantones	3	Grajos II	10
Junco I	1	Grajos III	6
Junco II	8	Humo (Peña Rubia)	6
Mediodia	30	Laberinto	2
Monje II	5	Lomo del Herrero I and II	10
Monje III	4	Milano	41
Pedrera	11	Palomas (Peña Rubia)	13
Peliciego	14	Paso I and II	2
Pico de la Tienda I	34	Pozo I – IV	54
Pico de la Tienda II	11	Pucheros	1
		Rumies	3
		Serreta	51
Total Result	**312**	**Total Result**	**343**

example, Alonso Tejada and Grimal 1996; Domingo Sanz 2004; Mateo Saura 2004). The basic components which make up an anthropomorph are a recognizable body, head, and limbs. Depending on the state of preservation, a given motif may not exhibit all of these components, which leads to some difficulties in classification. They are sometimes grouped into genders, but there are also a number of indeterminate figures. A variety of head shapes, limbs, clothing, and body shapes are also present in both styles and reflect various actions as well as dress or adornment.

There are multiple forms which appear to be anthropomorphic, and which cannot by explained solely by the difference between the Levantine and Schematic styles. There are 161 anthropomorphs in the study area, not including phi-like figures, ramiforms, or other motif types which are possibly anthropomorphic but not positively identifiable as such. These latter motif types, of which there are 93 motifs in the study area, are sometimes considered to be anthropomorphs in the literature, but are quite different from the more conventionally recognized naturalistic or stick figure humans, and may represent special anthropomorphs or idols.

They are considered as a separate class here because of the difference between these and other more obviously anthropomorphic figures.

Table 7.2: Frequency of anthropomorph body types.

Anthropomorph motifs	
Type	Number motifs
Possible anthro., proportionate body	7
Possible anthro., stick body	32
Archer	17
Asexual, proportionate body	14
Asexual, stick body	26
Female, other	1
Female, with skirt	29
Male, proportionate body	19
Male, stick body	4
Round body	3
Thick line body	6
Salamander	3
Total	**161**

Body shape and size The basic body shapes identified here are variations of stick figures (branch, cross, line group, salamander, stick) or naturalistic shapes (elongated, proportional, round, thick line). Different body shapes, especially the thick line and round body shapes, seem to invoke a different concept. The least common body types are a rounded, balloon-like body and a salamander-like shape (table 7.2). In the present sample there are only 3 of the former (at Los Grajos I, El Milano, and Pico de la Tienda I) and 3 of the latter (at El Pozo III and La Serreta). Following the designations of other researchers (Montes Bernárdez and Salmerón Juan 1998), these anthropomorphs are classified as Levantine and Schematic, respectively. The body shape is partly inherent in the style group to which a given image belongs. As noted previously, Levantine style motifs are generally proportional when compared to an idealized human figure (Domingo Sanz 2004:121). They also typically have some definition of muscles in the arms and legs, as well as detailed heads. Some Levantine motifs in the present study appear to be quite elongated, usually with raised arms; others have unusually exaggerated muscles. Partial Levantine style anthropomorphs are generally easier to identify than partial stick figure Schematic style anthropomorphs, because these shapes are not simple geometrics.

Stick figures are generally composed of a central vertical line of a more or less uniform thickness, with intersecting horizontal lines near the top and/or bottom. Sometimes they appear to have an enlarged top end indicating a head, but images with defined hands and feet, or other anatomical features such as knees or hands, are classified as other types of anthropomorphs. Several of the motifs in the present sample could be strictly classified as intersecting lines due to their lack of one or more of these three basic components of anthropomorphs. However, because they exhibit similar proportions or are found in a group with other stick-figures, they are classified as anthropomorphs, with the additional designation "possible". Defined hands and feet are noted in some instances, however, they are not very common.

Table 7.3: Frequency of defined feet and hands in anthropomorphs.

	Defined feet	Defined hands	**Total**
AnthPossProp	1		**1**
Archer	2	2	**4**
AsexProp	2		**2**
AsexStick	6		**6**
FemSkirt	6	3	**9**
MaleProp	2	3	**5**
MaleStick	1		**1**
Salamander	3	1	**4**
Thick	1	1	**2**
Total	**24**	**10**	**34**

Identifying gender Anthropomorphs are often described as male or female in the literature. Generally speaking, anthropomorphs in post-Palaeolithic rock art have been considered to be female if they seem to have long skirts or breasts and appear to be holding agricultural implements, whereas images are considered male if they have a penis or are carrying weapons, that is, they are holding or using a bow and arrow or spear. However, motifs are sometimes described as female in the literature with no explanation. For example, Milano panel 1 motifs 2 and 8 are described as possible females in Mateo Saura (1999:172); however, motif number 2 (figure 7.1) can also be described as a vertical oval with a bar across the top and some associated remnants of paint. The image seems to have possible horns or a similar headdress, and has a wider body than the other figures, which appears to be filled in with vertical stripes. Although the hip area of motif 8 is wider than the torso or leg areas, there are no obvious breasts or skirt.

It is possible that there were multiple ways of depicting women, associated with different concepts. Images which seem to have an indeterminate gender are also often considered to be male; however, the

Figure 7.1: Detail of figures 1-3, El Milano shelter I, panel 1. Figure 2 has been described as a possible woman (Mateo Saura 1999:172), but it is unclear what this identification is based on. Enhanced from a photograph by D. Arsenault.

deliberate inclusion of anatomical features (breasts or penis) in the other figures suggests that they represent distinct categories. Archer figures are usually regarded as male, but again, they do not all have identifiable penises. Similarly, figures which appear to be wearing long skirts are often identified as female in the literature, but not all of the figures with skirts have defined breasts, and a few examples (Los Grajos) are identified as male by other researchers. Because some motifs have prominent indicators of gender (phallus, breast, skirt) while others of the same style do not, it seems that there is a separate concept associated with these design elements (Escoriza Mateu 2002:99).

Table 7.4 shows the total number of anthropomorphs per each gender type, not including phi-like or ramiform motifs. Indeterminate gender figures, or those with no particularly obvious sexual characteristics, account for over half (85) of the motifs. Female and male figures are occur in roughly equal numbers at 35 and 41, respectively. Most of the identified attributes are fairly rare, but occur with similar frequency across these gender groups. Such attributes include headdresses or exaggerated head shapes, defined fingers and feet, and unusual body sizes (very large or very small).

Table 7.4: Anthropomorph gender totals, not including phi-like figures or ramiforms.

	Female	Indet.	Male	**Total**
AnthPossProp		7		**7**
AnthPossStick		32		**32**
AsexProp		14		**14**
AsexStick		26		**26**
Salamander		3		**3**
Round	1	2		**3**
Thick	4	1	1	**6**
FemOther	1			**1**
FemSkirt	29			**29**
MaleStick			4	**4**
Archer			17	**17**
MaleProp			19	**19**
Total	**35**	**85**	**41**	**161**

Head shapes Many of the anthropomorphs in the study area, as well as in the distribution of post-Palaeolithic rock art in general, seem to have headdresses or perhaps elaborate hairstyles. Although the individual types of head are each relatively rare in the study area, overall there are 61 motifs which have an unusual or pronounced head shape. The most common variations are the branching or feather-like heads and the rounded heads, at 15 and 26 motifs respectively. Headdresses or emphasized head shapes in general are evenly distributed across these types (table 7.5). Motifs which may not be anthropomorphs (phi-like and ramiform motifs) have an apparent headdress in 7 and 6 cases, respectively. When viewed by gender categories, unusual head shapes are found in 17 female motifs, 18 asexual motifs, 13 male, and 13 other anthropomorphic motifs. The general uniformity of the frequency suggests that the occurrence of a headdress is not determined by the gender of a given motif, or indeed whether or not the gender is emphasized.

The most common variation is the exaggerated round head, of which there are 26 examples (table 7.5): at Cejo Cortado I, Los Grajos I and III, Mediodía, and Pico de la Tienda I. Branching heads include those that appear feather-like and possible antlers or horns, lending a therianthropic

Table 7.5: Frequency of head shapes in anthropomorph and possibly anthropomorphic motif types, organized by gender meta-categories. The totals include phi-like and ramiform motif types, but do not include motifs which do not have unusual head shapes.

		Anchor-like	Branch.	Elong.	Flat	Round	Triang.	**Total**
Female	FemSkirt		3	1		8	1	**13**
	Round					1		**1**
	Thick			2			1	**3**
Asexual	AnthPossStick					2		**2**
	AsexProp		4		2	3		**9**
	AsexStick	2				4		**6**
	Salamander	1						**1**
Male	Archer				1		1	**2**
	MaleProp		3	1		5	1	**10**
	Thick			1				**1**
Other	Phi	1	4	1	1			**7**
	Ramiform		1		2	3		**6**
	Total	**4**	**15**	**6**	**6**	**26**	**4**	**61**

appearance. These include two phi-like figures at Los Grajos II (Montes Bernárdez and Salmerón Juan 1998:38, figure 6.35). Five of these anthropomorphs appear in the "dance" scenes at Pico de la Tienda I, one at Pico de la Tienda II (motif 8, figure 6.19 on page 138) seems to have additional rays or short lines radiating around it, and one is found in an isolated location at Los Grajos II (figure 6.34 on page 153). The headdress on the "idol" motif at La Serreta, classified as phi-like figure (panel 2, motif 38, 6.24 on page 144) has been interpreted as a set of bull horns, worn pointing downward (Salmeron Juán 1999:180). Two other images at La Serreta have similar anchor-like headdresses (panel 1, motif 38; and panel 2, motif 2, figure 6.21 on page 142), as does the motif from Los Rumíes (figure 6.28, page 149). Six motifs have very tall or long heads relative to the rest of the body, while triangular heads appear on four motifs.

Clothing and jewellery Clothing is frequently invoked as a characteristic of gender, but is not generally associated with anatomical features, due to the rarity of the latter. Two of the three figures which have apparent breasts also have skirts. Although it has been asserted that all figure with skirts have breasts, even if that figure is facing forward, (Escoriza Mateu 2002:90-91), this assumption is not made here, because it seems impossible to verify if the image is not in profile. Only one of the figures seems to be both phallic and have clothing of any sort (perhaps not surprising, if an obvious phallus implies nakedness).

Clothing is quite rare overall, as shown in table 7.6. In the present sample, 36 anthropomorphs appear to have some type of clothing or jewellery. Anthropomorphs with apparent clothing, usually some form of skirt, are typically identified as female. Male anthropomorphs have a wider range of items, including the only figure in the present sample

Table 7.6: Frequency of clothing and jewellery in anthropomorphs, classified by gender.

Type	Bracelets	Cape	Skirt, long	Skirt?	Skirt, short	Trouser	**Total**
Archer	1					1	**2**
FemSkirt			21	5	3		**29**
MaleProp					3		**3**
Thick		1					**1**
Phi				1			**1**
Total	**1**	**1**	**21**	**6**	**6**	**1**	**36**

which appears to have bracelets (a Semi-Naturalistic archer image at La Serreta, panel 1, motif 14; figure 6.22), an image which may have a cape (Las Palomas, panel 1, motif 10), possible short skirts or kilts (Los Grajos I, panel 1, motifs 22, 23, 24, 34, 38, and 46), and one example of possible trousers (Las Conchas, panel 1, motif 3). Figures that have long skirts and breasts are Los Grajos I, panel 1, motif 9 and panel 2, motif 48. One motif on panel 1 (number 24) appears to have both a penis and a short skirt or kilt.

Anthropomorph types used in this study

Based on this analysis, anthropomorphs have been classified primarily in terms of gender, whether male, female, or indeterminate. Gender characteristics are the most distinct design elements, and while other features may carry meaning, as discussed previously, these occur too rarely to meet the criteria of a sufficiently generic motif type. Motifs which are described as male or female in the literature, but which lack features such as sex characteristics, clothing, or weapons, are classified as "possible" male or female, and the characteristics which they share are further investigated. The identification of some figures as anthropomorphs is ambiguous in some cases, especially those which are partial remains of a figure. Where these are intact enough to suggest the original form, they have been classified as "possible": male, female, or indeterminate anthropomorph. In several cases it is not clear that the images are anthropomorphs at all, although the painted areas seem to be parts of, for instance, skirts, legs, or arms. Many figures have simple bodies with no defined heads, hands, or other anatomical features; these are here defined as indeterminate gender. Some images have been classified differently than other researchers suggest, as further investigation revealed additional details or demonstrated that the images appear to be more ambiguous than the published descriptions would suggest. For some of the following analyses, these apparent or possible motifs were combined into meta-categories which treat them as simply indeterminate, male, or female. Unlike the original gender designations assigned by other researchers, these meta-categories include the phi-like and linear abstract motifs which may be better viewed as other types of anthropomorphs (see table 7.4).

7.1.2 Ramiforms, idols, and phi-like figures

Bisected circles, also known as phi-like figures, are a problematic class. In a strictly formal sense, phi-like figures can be considered part of a class of circular motifs, together with so-called poly- and bi-lobed figures. As understood here they include the phi-like, poly-lobed, and anchor-like motif types. All of these types consist of a curvilinear element which is divided by a vertical line. There is little variation in the motifs which cannot be accounted for by description, so they are not analysed in the same detail as the the anthropomorphic motifs. So-called "poly-lobed" motifs may be conceived of as being made up of a stack of such phi-like figures. Some bisected figures (for example, Buen Aire II) have been identified as possible trees in some publications (Mateo Saura 2005*a*). These tree- or anchor-like motifs appear to be variations on the general theme, as these are made up of curved horizontal lines bisected by straight vertical lines. It may also be that the bisected figures as a group represent points on a continuum: they are also quite similar to some stick figure anthropomorphs which are composed of curved rather than straight lines. There are 62 bisected motifs in the study sample, of which 38 are phi-like figures (table 7.7). In addition, there are 7 anchor-like, 1 unusual bisected motif (the newly revealed image at La Serreta), and 16 poly-lobed motifs.

Table 7.7: Frequency of possibly anthropomorphic motifs. All figures in this class feature a central vertical line which bisects the motif. These are often considered to be anthropomorphs, but this identification is not always certain.

Possibly anthropomorphic	
Type	Number motifs
Anchor-like	7
Bisected	1
Phi-like	38
PolyLobed	16
Ramiform	32
Total	**94**

The central figure in the group of phi-like figures at La Pedrera (figure 6.14) was previously identified as phallic (Hernández Carrión and Gil González 1998:100-101), although this interpretation does not seem to be held up by further investigation in the field (see chapter 6). All three phi-like figures on this panel seem to have rounded heads or headdresses, as do motifs 2, 3, and 4 at Los Grajos II, panel 1. Four phi-like motifs have branching headdresses: Cejo Cortado I, panel 2, motif 6; Los Grajos II, panel 1, motifs 1 and 5, and Milano, panel 2, motif 19. However, most phi-like figures often do not have defined heads or legs, and are sometimes rather elongated (see figure 6.39). Bisected circles are in some cases found on the same panels and scenes as Schematic stick-figure anthropomorphs (Cejo Cortado I, panel 5; Pedrera, Pico de la Tienda II, panel 1; Pozo III, panel 2, and Serreta panel 1), which suggests that they represent a concept which is different from the more straightforward stick-figure anthropomorphs. They are not, however, found together with Levantine anthropomorphs in any of the panels analysed here.

Table 7.8: Frequency of ramiform motifs by type and site. The majority of the ramiform motifs in the study area are found at Los Cuchillos.

	Site Name	**Total**
Ramiform	Buen Aire II (E)	**1**
	Cantos de la Visera II	**2**
	Cuchillos	**16**
	Enredaderas I and II	**2**
	Monje III	**1**
	Pozo IV	**1**
	Serreta	**1**
With eyes	Cuchillos	**3**
Defined head	Cuchillos	**5**
Total		**32**

Many post-Palaeolithic rock art motifs across Mediterranean Spain resemble the carved bone "eyed idols" and similar motifs frequently found on ceramics (figure 6.25 on page 145). Several motifs in the current study bear many similarities to these idols, although they are not necessarily similar to each other (table 7.8). Common characteristics of the possible idol figures are rayed lines or fringes, especially on the top or head area; dots or rayed circles which appear to be eyes, and transverse, curving lines under these circles (figure 2.8 on page 30).

Idol-like motifs are found at Cantos de la Visera II (figure 7.3 on page 183), Los Cuchillos (figure 6.31 on page 151), Enredaderas (figure 6.25 on page 145), Mediodía (figure 6.8 on page 125), La Serreta

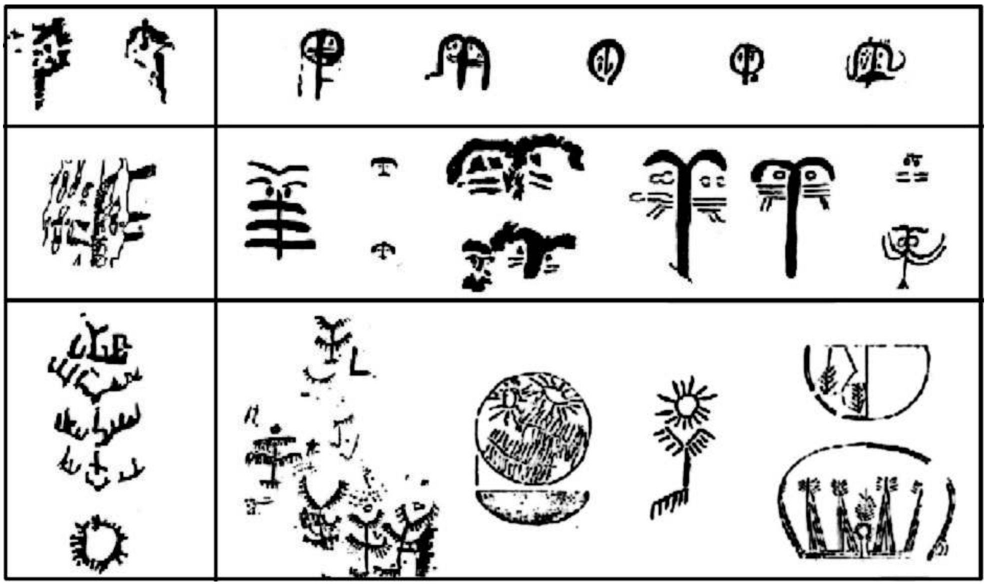
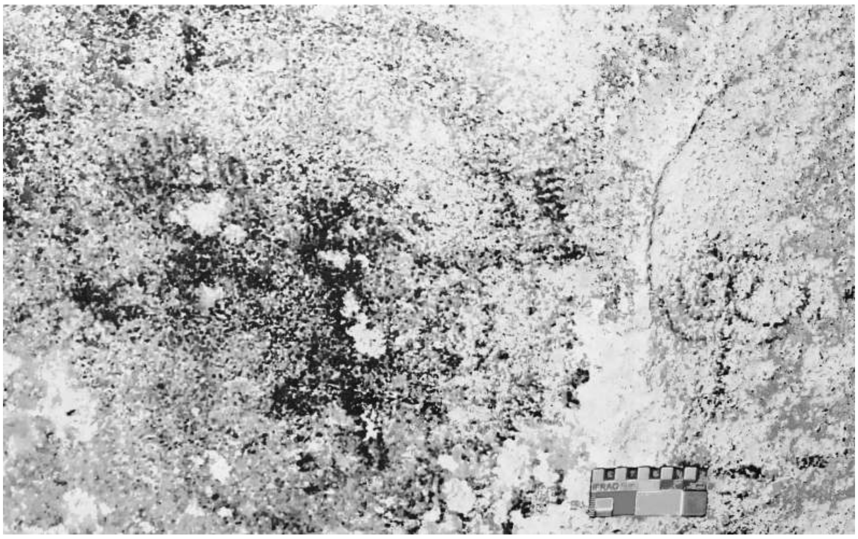


Figure 7.2: Drawing comparing the idol-like motif at Enredaderas with other artefacts. From (Salmeron Juán and Teruel 1990:149).

(figure 6.20 on page 141), and El Pozo (figure 6.38 on page 159). Although these motifs can be classified as Schematic in style, they seem to be rather different from the typical Schematic stick-figures in several respects. The most prominent example of rayed lines is the motif at La Serreta (figure 6.20 on page 141). This image appears to be an elaborated phi-like figure with a large headdress, surrounded with short lines. Most of these motifs are here classified more prosaically as circular or linear abstract motifs, partly because they are too unique to be reliably grouped into a class of their own, and partly because they more strongly resemble other classes. One anthropomorph, at Pico de la Tienda II (motif 8, figure 6.19 on page 138), appears to have at least three vertical lines emerging from its head. An enigmatic motif at El Pozo III (panel 5, motif number 36; figure 6.38 on page 159), classified as a rayed circle in the present study, might actually be the remains of a more elaborate idol-like figure. The row of at least seven vertical lines at the top of the figure is strongly reminiscent of both the idol motif at La Serreta and Macroschematic motifs elsewhere. Cantos de la Visera II motif number 29 has rays but is classified as poly-lobed, while motif number 28 is classified as a cross with a comb-like top (7.3 on the next page).



(a) Enhanced photograph

(b) Drawing

Figure 7.3: Idol-like motifs, numbers 28 and 29, Cantos de la Visera II. Figure a, enhanced from a near-infrared photograph by the author. Figure b, drawing by Alonso and Grimal, provided by Yecla museum staff during a site visit.

Table 7.9: Frequency of idol-like design elements across classes and types.

	Anthro.	Bisected	Circular	Linear	**Total**
Anthro, anchor-like head	3	1			**4**
Anthro, branching head	10	4		1	**15**
Anchor-like		7			**7**
Bars				4	**4**
Comb				7	**7**
Ramiform				24	**24**
RamiformEyed				3	**3**
RamiformHead				5	**5**
RayCircle			2		**2**
Triangular				2	**2**
WavyZigzag				5	**5**
Total	**13**	**12**	**2**	**51**	**78**

Other motifs exhibit curving lines reminiscent of the transverse lines on the idols, which may represent facial tattoos or paint (del Rincón 2002:314). Examples of sites with such motifs, known as ramiforms, include Enredaderas (figure 6.25 on page 145), Monje III (identified as an idol in Hernández Carrión and Gil González 1998), Los Cuchillos, which has several ramiform and other Schematic anthropomorph and zoomorph figures; and Cantos de la Visera II. Cantos de la Visera II (motif number 42) is classified here simply as a group of curved lines, because of its irregular shape. In field visits and photographs it is very difficult to discern some details, but see Alonso and Grimal's updated recording (figure 6.5 on page 123) which suggests the presence of rays or bristled lines over the curved lines. In the field, it is much more apparent that there are two nested curved lines on the left side of this image, together with an apparent dot in the centre, in addition to the rayed lines over the top of the dots. If this is representation is at all accurate, then this figure might be better interpreted as an eyed idol, similar to those found on ceramics and carved bone figurines throughout the Mediterranean of Spain (Garcia Atiénzar 2006).

7.1.3 Non-representational motifs

Generally, abstract motifs are images which modern observers cannot identify as corresponding to actual entities in the physical world. In this study they are grouped into linear and circular motifs for convenience of

Table 7.10: Frequency of idol-like design elements across styles.

	Levantine	Schematic	Semi-naturalistic	**Total**
Anthro, anchor-like head		1	3	**4**
Anthro, branching head	8	7		**16**
Anchor-like		7		**7**
Bars		4		**4**
Comb		7		**7**
Ramiform	1	23		**24**
RamiformEyed		3		**3**
RamiformHead		5		**5**
RayCircle		2		**2**
Triangular	1	1		**2**
WavyZigzag		5		**5**
Total	**10**	**65**	**3**	**78**

reference. Many of the motif types which are here defined as non-representational, such as intersecting lines and bisected arcs, are considered to be type of anthropomorphs by other researchers. However, in my view this interpretation is questionable in some cases. For example, some of the *brazos en asa* (hands on hips or phi-like) variations identified by Acosta (1968:28-32) appear to share few characteristics with more conventional anthropomorphic motifs, and are only linked to the phi-like motifs by virtue of having vertical lines within a symmetrical shape, usually circular but sometimes rectangular. Acosta argues that these cannot represent cart-wheels due to comparison with other motifs that are more readily recognized as carts; however, it seems probable that they represented some other concept entirely. Many abstract motif types are quite rare, particularly in the study area.

The linear group, which includes 106 motifs, consists of grid patterns (including those identified as Linear-Geometric by earlier researchers), comb-like (or pectiniform) motifs, isolated straight lines, and triangular shapes. Crook-shaped lines are usually vertical, with a curved segment at the top end of the line. In addition to simple bars or lines, comb- or rake-like forms are also found, such as those at Cantos de la Visera I and II (see examples in figure 2.10 on page 32). Nested curves are simply a group of curved lines in close proximity. Intersecting and irregular groups of lines are those not recognizable as figurative or regular geometric motifs, such as squares or triangles. Wavy and zigzag lines have also been

Table 7.11: Total number of non-representational motifs, by class and type.

Non-representational motif types	
Type	Number motifs
Circular	
DotsGroup	4
Lines	12
RayCircle	2
Class total: 18	
Linear	
Bars	4
Comb	7
Crook	8
Grid	6
Lines	5
LinesCurved	2
LinesGroup	10
LinesIntersecting	6
Projectile	8
Ramiform	24
RamiformEyed	3
RamiformHead	5
Straight	11
Triangular	2
WavyZigzag	5
Class total: 106	
Total motifs, all groups: 124	

identified in some sites. The circular class, of which there are 18 motifs in the study area, includes straightforward circles, semi-circular lines, and groups of dots. These are formally related to bisected motifs, although in this study the latter are considered as a separate class due to the ambiguity of the phi-like figures.

7.1.4 Zoomorphs

The zoomorphic motifs identified in the study area, of which there are 183 motifs, appear to represent wild boars, bulls, caprids, cervids, equids, and one possible bird (at Cantos de la Visera). Some possible canids (dog or fox) have been mentioned (Domingo Sanz 2004:111, see also Los Grajos I, panel 1, motifs 27, 32, 36, 42, and panel 2 motif 49, figure 6.33 on page 153). As in other rock art worldwide, one of the primary features which permits identifying species of animals is the shape of the head, especially the shape of apparent horns or antlers; body shape, and tail shape. Recent studies have considered the implications of different postures of the animals (Alonso Tejada and Grimal 1996; Mas Cornella 2001), however, the present study does not attempt to define new zoomorphs as they are relatively un-ambiguous. Ambiguous zoomorphs, which cannot be positively grouped into a given species, are classified as "indeterminate" zoomorphs, while areas of paint which appear to be partial animals of a particular type are classified as "possible" figures in all categories. Some of the indeterminate figures may in fact represent female or juvenile animals without horns or antlers. In the present case, body shape variation is mainly accounted for by the overall style of the images, and differences noted in body shape are not analysed further here.

Table 7.12: Total number of zoomorph motifs, grouped by species and whether identification is definite or uncertain (possible).

Zoomorphs			
	Definite	Possible	**Total**
Bird	1		**1**
Boar		6	**6**
Bull	17	3	**20**
Caprid	23	12	**35**
Cervid	13	6	**19**
Equid	4	18	**22**
Zoom (Indet.)	48		**48**
Zoom (Poss.)		32	**32**
Total	**106**	**77**	**183**

Bulls are generally recognizable on the basis of either lunate horns (horns which curve in toward each other in a half-moon shape) or the distinctive hunched withers common in cattle and related species. Possible wild boars are found at Los Grajos I, and motif number 13 at Peliciego has been suggested to represent a boar (Martínez Abellán and Abellán Carrión 2003:51). Cervids, or deer, are recognized through the presence of branching antlers. Caprids (mountain sheep or goats) are recognized by their long horns which curve backward over the body, as well as the absence of branching tines which mark cervids. Several motifs have been described as horses by other researchers because of the appearance of an elongated head and tail; because they lack distinctive head features such as antlers or horns, however, they are somewhat ambiguous. They have been classified as equids or possible equids here. As mentioned, in some cases the small size and relatively short neck of animals classified as equids suggests that they may be canids (fox or dog); however, these animals are rarely identified in the literature and it is not certain that any of the motifs in the study area can be classified in this way. Zoomorph images are not detailed enough in most cases to suggest different breeds, sub-species, or age of the animal. An exception is the caprid at Los Pucheros, which appears to have been repainted or filled with stripes of a different colour; these stripes have been suggested to represent markings showing the age of the animal (Montes Bernárdez and Salmerón Juan 1998:43). The striped bodies in the boar-like animals at Los Grajos I might have been intended to convey similar information.Several animals in the study area are very large compared to the other motifs on the same panel, particularly several of the bulls at Cantos de la Visera (shelter I, motifs 7, 13, and 14; and shelter II, motifs 25 and 31). One of the large zoomorphs at Pico de la Tienda I (motif 45) was identified as a bull by Salmerón Juan et al. (1997), although the head is obscured by a calcite deposit, making this identification somewhat uncertain. Two large zoomorph motifs appear to be cervids (Pico de la Tienda I, motif 26; and Milano, panel 1, motif 10). The frequency with which each species occurs is given in table 7.12.

The most commonly identified zoomorphic figure in post-Palaeolithic rock art is the caprid (Alonso Tejada and Grimal 2005*a*:49), which is found in many different situations and seeming to portray several actions. Examples are found in several sites throughout Mediterranean Spain, although there seems to be distinct enclaves in terms of the size and number of individuals depicted; some areas have none at all, even when they are in close proximity and the same style (compare Gargantones and Pico de la Tienda, for example; Alonso Tejada and Grimal 2005*a*:48). Some categories of zoomorph, such as boars and possible canids, are too rare to be included individually in the chi square analysis; again, these are analysed in terms of frequency.

7.2 Hierarchical cluster analyses

Hierarchical cluster analysis is used here to explore structure within the data, that is, to identify groups of sites which are similar to each other in terms of the presence or absence of different motif types and landscape characteristics. As noted in chapter 5, the analyses performed here use the Jaccard coefficient or binary distance measure, which discounts negative matches between pairs of cases, and the average or between-group linkage function, which groups cases based on the average similarity of cluster members. There are two things to keep in mind when inspecting the dendrogram produced by a hierarchical cluster analysis. First, the dendrogram produced indicates how closely related the cases are to each other, but it does not necessarily indicate the best number of clusters which can be derived from the data as a whole.

A second feature of the dendrogram is that the height of the line linking each cluster gives an indication of the degree of relatedness between the two items being joined. In both of the analyses performed here, an examination of the dendrograms suggests that within the identified clusters, the relative differences between individual cases are in some instances rather large. This suggests that although the cases in these clusters are more similar to each other than to the other clusters, there may be some additional structure within each cluster which cannot be accounted for using this analysis method. These "sub-clusters" are compared to each other as appropriate in the discussion below.

7.2.1 Cluster analysis 1: Motif types and landscape variables

The first analysis run includes all the variables, coded as presence or absence. Variables in this case are the motif type, viewshed, visibility, access, elevation, landform, shelter, and style. The resulting dendrogram in figure 7.4. Table 7.13 lists the sites which are grouped into each cluster, and gives the total number of distinct types found on the sites in each one. Note that there is some distance between cluster members in clusters 2 and 5, creating possible "sub-clusters", discussed in more detail below. The results of this analysis are briefly described here, but see the tables in appendix D for the full details of the motif types represented in each cluster.

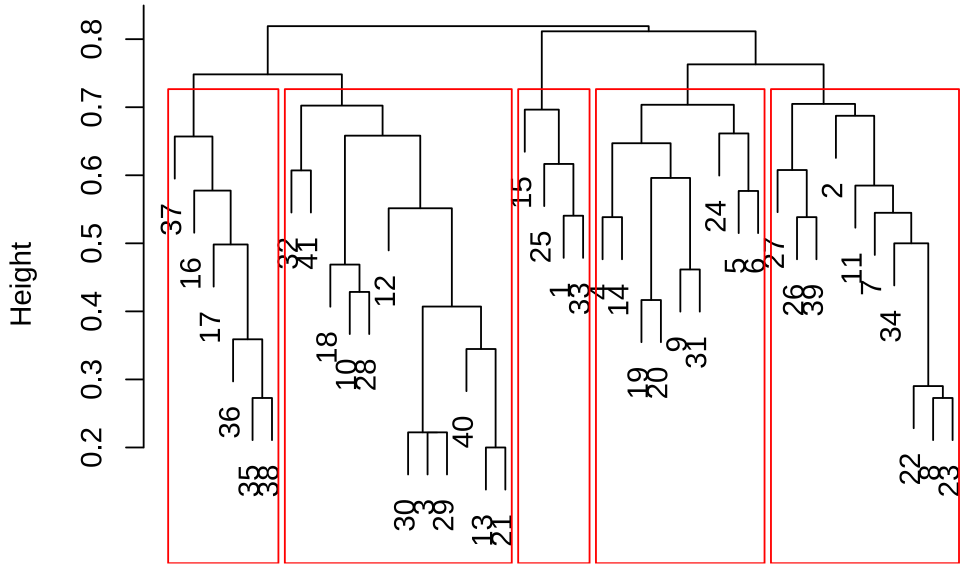


Figure 7.4: Dendrogram for cluster analysis 1, hierarchical cluster analysis of both motif types and landscape variables together.

Cluster 1, which consists entirely of the shelters at El Pozo and Los Grajos II and III, is characterized by the lower canyon locations of these sites. In addition to their similar position in the landscape, all of the sites in this group exhibit a single style (Schematic, in broad terms). Anthropomorph types include possible stick figures and males, females with skirts, and salamander motif types. Most of the bisected and circular motif types are represented, as are most of the linear motifs including ramiforms, but not triangular motifs or zigzag lines. There are, however, few animal motifs in this cluster. Only caprids, possible equids, and indeterminate quadrupeds are represented.

As a whole, the sites in cluster 2 also appear to be characterized by their location in high areas, with restricted viewsheds, difficult access and low visibility. All of the Almadenes canyon sites fall into this cluster, with the exception of Enredaderas I and II. None of the sites in this group are comprised of Levantine style motifs alone. Most sites are exclusively Schematic, with two mixed Schematic and Levantine style sites. The motif types in this cluster include mainly asexual anthropomorphic motif

Table 7.13: Sites per cluster and the total number of different motif types per cluster, Cluster analysis 1. Cluster analysis 1 includes all landscape variables as well as motif types.

Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Grajos III	Enredaderas IV*	Buen Aire I	Canto Blanco	Buen Aire II
Grajos II	Paso I*	Milano	Junco I	Enredaderas I and II
Pozo I	Humo	Pico de la Tienda I	Conchas	Monje III
Pozo II	Palomas	Cantos de la Visera I	Cantos de la Visera II	Cejo Cortado II†
Pozo III	Cuchillos		Cejo Cortado I	Lomo del Herrero I†
Pozo IV	Peliciego		Grajos I	Lomo del Herrero II†
	Serreta		Junco II	Pico de la Tienda II
	Gargantones		Mediodia	Monje II
	Paso II*		Pedrera	Pucheros
	Cabras*			Collado de las Hermanas
	Laberinto*			
	Rumies*			
Total motif types per cluster:				
22	30	34	33	23

*Sub-cluster 2b
†Sub-cluster 5b

types, including salamander and thick-bodied types, as well as archer motifs. There are no clearly female motif types represented in this cluster, however. Most of the bisected and linear motif types are found in this cluster, including ramiform motifs, although there are no groups of dots or rayed circles. All of the zoomorph types except bulls are found in this cluster.

As noted above, there appears to be something of a split within cluster 2 (denoted as 2a and 2b for ease of reference; see appendix D, section D on page 349 for full details). All of the archer figures and anthropomorphs with shaped bodies are found in sub-cluster 2a, while the anthropomorphs in sub-cluster 2b are all stick-figure types. Both sub-clusters contain bisected and curvilinear motifs, but sub-cluster 2b has no linear motifs and contains only one site with an animal motif (a caprid at El Paso II). Sub-cluster 2b includes most of the Almadenes canyon sites except La Serreta, which falls into sub-cluster 2a. This sub-cluster differs from sub-cluster 2a as a whole in that these sites exhibit only Schematic style motifs, while two sites in sub-cluster 2a also contain a Levantine style motif. However, both sub-clusters are very similar in terms of location, in that they are found high above the surrounding terrain, in areas which are difficult to access and have low visibility.

Cluster 3 is dominated by anthropomorphs and zoomorphs, although some bisected, circular, and linear motifs are represented in this group. However, it is interesting to note that these latter do not include grids, groups of dots, or ramiform motifs. The sites in this group do not seem to have a strong tendency to be associated with any particular landscape variables except for a wide vista viewshed, and none of them are located in canyon settings. All of the sites in this group are mixed Levantine and Schematic style. Cluster 4 is similarly broad, including examples of nearly every motif type including ramiforms. The sites in this cluster tend to be located in areas with a wide viewshed and easy access, though not exclusively so. None of the sites in this group are exclusively Levantine in style, although two sites are mixed with Schematic style motifs. The main difference between clusters 3 and 4 seems to lie in the occurrence of fewer anthropomorph types and more zoomorph motif types in cluster 4, together with the lack of Schematic-only sites in cluster 3.

Overall, cluster 5 is characterized by asexual stick figure anthropomorphs and female figures with skirts, but no motifs which are clearly male. Sites in this cluster have anchor-like and phi-like motif types, but not poly-lobed figures, and examples of all of the circular motif types. The set of linear motif types is reduced, however, and includes ramiform motifs and bars, but not grids or wavy lines. Most zoomorph motif types occur in this cluster, with the exception of equids. These sites tend to be located in areas with a wide viewshed and good visibility, but with difficult access, high above the surrounding terrain. The sites in this group contain either Levantine or Schematic style motifs, but not both on the same panel. Cluster 5, as mentioned above, also appears to have a sub-cluster, although it is not as pronounced as sub-cluster 2b. This group (sub-cluster 5b) consists of Lomo del Herrero I and II and Cejo Cortado II, which seems to be distinguished from sub-cluster 5a by the generic quality of the motif types in these sites. This sub-cluster contains only curved and straight lines, and possible caprids and unidentifiable quadrupeds. Because these sites are in the same general location, they have similar landscape characteristics, and it is this property which may be reflected in the relatively large height of the dendrogram branches between sub-clusters 5a and 5b.

Inspection of these result suggests that the landscape variables may be dominating the structure within the data, due to the seemingly disparate nature of some of the sites which are grouped together, and the large numbers of sites in clusters 3 and 4 compared to the other groups. However, it is interesting to note that in some respects these results seem to echo Fairén's (2002*a*) rock shelter types in Alcoy (see table 4.1 on page 74), in that there is a similar tendency to find particular combinations of styles and landscape variables present at the same sites. However, the correspondence is not exact. Further, due to the differences in styles found in Alicante as compared to Murcia, it may be possible that there is additional structure in the body of rock art motifs itself that can be understood independently of the landscape characteristics. The second cluster analysis will only take into account the motif types in order to explore these combinations.

7.2.2 Cluster analysis 2: Motif types only

Cluster analysis 2 repeats the analysis with the landscape variables excluded. Based on the relative height and the spread of the groups which were created, the dendrogram is split into six clusters. Some of these clusters are very small, such as cluster 1, but the height of the branches suggests that the sites within these clusters are substantially different from the other groups. Enredaderas IV and El Paso I are the sole members of cluster 1. Both sites are located in Almadenes canyon, thus sharing a landscape context, and both have only Schematic style motifs. These motifs are asexual stick figure humans and a poly-lobed figure. Cluster 2 has more members, but does not have a strong pattern in terms of landscape variables. None of the sites in this group have mixed Levantine and Schematic motifs, although one site in this cluster contains only Levantine style motifs (Monje III). The motif types in this group are not particularly diverse, consisting of asexual stick figure anthropomorphs, anchor-like motifs, and several examples of linear and circular motifs including ramiforms. The only animal figures in this cluster are cervids or indeterminate quadrupeds. Cluster 3 is also quite small, with only three members: the Peñ Rubia sites. Because these sites are located on the same peak, their landscape context is identical. All three sites have archer figures and two have thick-body anthropomorph motifs, but no bisected, circular, or linear motifs except a group of intersecting lines. Animal figures include examples of all species found in this area except bird, boar, and equid.

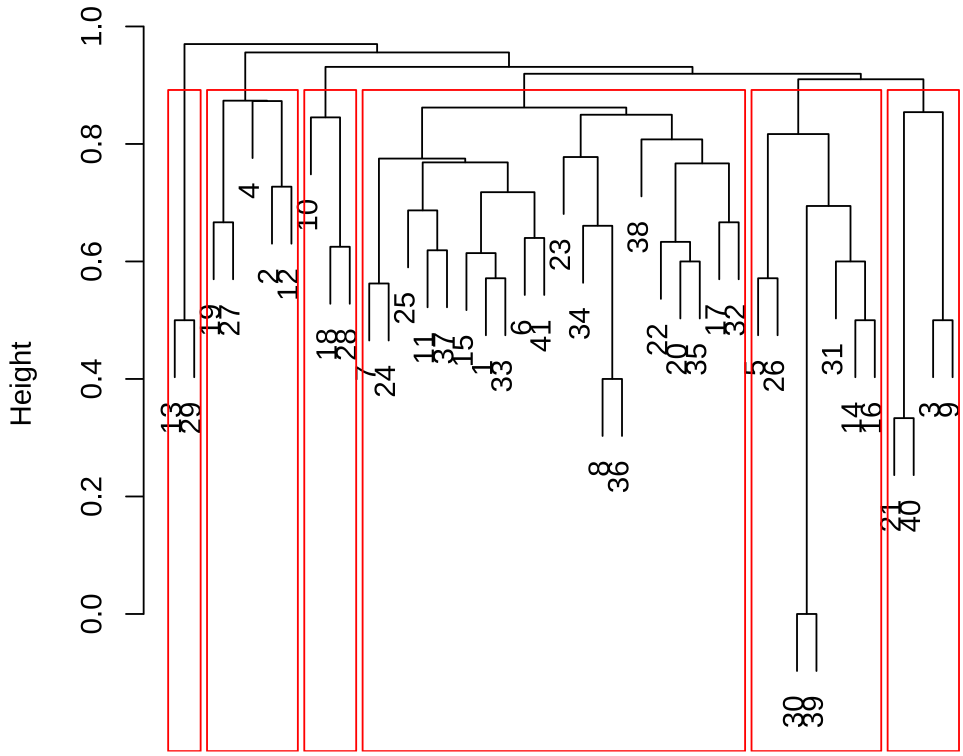


Figure 7.5: Dendrogram for cluster analysis 2, hierarchical cluster analysis of motif types only.

Cluster 4 contains the majority of the sites, and can be considered to have two sub-clusters. Although this cluster is large, the sites are more frequently located in areas with wide viewsheds, lower visibility, and high above the terrain. Most of the sites in this group contain exclusively Schematic style rock art, although one site (Los Grajos III) is Levantine only, and five sites are mixed. Every motif type recorded is represented in this cluster. If this cluster is considered in terms of two sub-clusters (4a and 4b), a slightly different pattern emerges. Sub-cluster 4a continues the pattern of the cluster as a whole, except that there are no sites with Levantine style motifs alone. In sub-cluster 4b, however, the only anthropomorph types represented are asexual stick figures and females with long skirts. This group includes phi-like and poly-lobed figures and

Table 7.14: Sites per cluster and the total number of different motif types per cluster, Cluster analysis 2. Cluster analysis 2 excludes the landscape variables and considers the presence of absence of motif types per site only.

Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6
Enredaderas IV Paso I	Canto Blanco Buen Aire II Enredaderas I and II Junco I Monje III	Humo Conchas Palomas	Grajos III* Buen Aire I Cantos de la Visera II Mediodia Cuchillos Grajos I Junco II* Lomo del Herrero I and II* Milano Peliciego* Pico de la Tienda I Pico de la Tienda II* Pozo I – IV* Serreta Cejo Cortado I Cejo Cortado II*	Grajos II Gargantones Cantos de la Visera I Pucheros† Monje II Paso II† Pedrera	Cabras Rumies Collado de las Hermanas Laberinto
Total motif types per cluster:					
2	13	9	48	11	4

*Sub-cluster 4b
†Sub-cluster 5b

non-specific circular and linear motif types, including ramiforms but not other idol-like motif types, such as grids or wavy lines. Zoomorph motif types represented include boars, caprids, equids, and non-specific quadrupeds. None of the mixed Levantine and Schematic style sites occur in this sub-cluster. Both sub-clusters echo the overall pattern of landscape variables.

Cluster 5 sites tend to be found in sites with a wide viewshed which are easily accessible, but are not strongly dominated by any other landscape variable. Sites in this cluster are equally Levantine, Schematic, or mixed in style. This cluster exhibits a greatly reduced set of motif types, however, as compared to the other clusters. Anthropomorph motif types include possible stick figure anthropomorphs, females with skirts, and males with proportional bodies. Phi-like figures are also found, but no other circular or linear motif types. All of the zoomorph motif types except birds and boars are represented. This cluster (5b, see section D in appendix D) has a small sub-cluster, consisting of two sites which are more distantly related to their closest matches. These sites (numbers 30 and 39 on figure 7.5, which correspond to El Paso II and Los Pucheros) are both located in high, difficult to access areas, and contain a single caprid of Schematic and Levantine style, respectively. By contrast, the sites in sub-cluster 5a contain all of the anthropomorph motif types occurring in the cluster as a whole, the phi-like figures, and examples of all of the zoomorph motif types in this cluster. The sites in sub-cluster 5a tend to be located in areas with a wide viewshed and easy access, and include sites with exclusively Levantine and Schematic style motifs as well as mixed sites. Cluster 6 is also a small group, consisting of just four sites. These tend to have restricted viewsheds, with low visibility and difficult access, and are high above the surrounding terrain. All of the sites in this group have Schematic motifs only, including possible stick figure anthropomorphs, phi-like and poly-lobed figures, and groups of curved lines. None of the other motif types, including linear and zoomorph motifs, are represented in this group.

The results of these two cluster analyses are rather different from each other, which suggests that factors other than style or location may be important in explaining the distribution of the motifs. The most obvious differences are that the same sites do not necessarily occur together in clusters in each analysis, and the dendrograms suggest different numbers of clusters for each analysis. The distribution of sites relative to the landscape variables is quite distinct between analyses, with fewer strong landscape-related patterns in cluster analysis 2. This is not entirely unexpected, given that this analysis did not consider the presence or absence of these variables in assigning sites to clusters. Likewise, the occurrence of different styles is less strongly patterned in cluster analysis 2, suggesting that landscape position is more closely linked to style at a broad scale than motif types.

Another interesting contrast between these two analyses is the apparent differences in the complexity of the sites which cluster together, in terms of the total number of motifs and the number of motif types represented at each site. In cluster analysis 1, the number of motif types represented in each cluster is not dramatically different (table 7.13), and the occurrence of motif types in different clusters is not strongly patterned. Cluster analysis 2, however, shows a rather different pattern. Most clusters exhibit fairly small numbers of motif types, ranging from two to thirteen, except cluster 4 which has forty-eight distinct motif types (table 7.14). The sub-clusters 4a and 4b may be partly related to overall style, in that most of the sites in this cluster which contain Levantine style motifs fall into sub-cluster 4a. A further distinction between these sub-clusters is that the sites in 4a tend to have large total numbers of motifs, ranging from twelve to twenty-four, versus sub-cluster 4b, which range from two to eight. Sub-cluster 4a also has more types of anthropomorph, although there is no strong contrast in the occurrence of the other motif types. The results of cluster analysis 2 support the idea that the occurrence of distinct motif types together on the same panels carried meaning, perhaps in a manner that was independent of the landscape context in which the sites were located. This relationship will be explored in the next section, in terms of both the motif types which occur together on individual panels and the apparent complexity of the sites as a whole.

7.3 Panels and combinations of motif types

As the cluster analysis in the previous section shows, there are some indications that certain motif types were preferentially placed together. However, it may be instructive to examine the occurrence of motifs at a more detailed level than as clusters based on the presence or absence of motif types at each site. In this section, the relationship between motif types at a panel level is investigated in two ways. First, a cross-tabulation analysis of the motif types which occur together on panels is performed. The discussion of motif combinations focuses only on those relationships in which the ratio is fifty percent or higher, or conversely those in which there is no relationship at all. Motif type combinations are investigated at the panel level, rather than the site level, because of the fact that some sites have multiple panels which are quite different in composition. El Milano is a case in point; the left side of the shelter contains mainly Levantine style motifs in an isolated alcove, while the other panels in the main section are mainly Schematic in style. This apparent segregation implies that the motifs were deliberately placed on a particular panel, which in turn suggests that there was an important relationship between the motifs on the panel itself.

Second, the relative complexity of the sites in the study area is investigated. The concept of complexity is often invoked in rock art studies; a common theme is that the nature of the images and their placement together reflects a deliberate choice intended to convey a particular message or identify a specific group or purpose (see, for example, Conkey et al. 1980; Hartley and Wolley Vawser 1998, 2005; Kintigh 1989). Of course, the nature of that message is not universal, and as noted previously it may not be possible to decode the components. In this respect, Gamble's (1991) analogy with intelligence monitoring remains apt: the volume and direction of information flow is a valuable indicator of underlying processes and activities, even if the individual messages are not fully understood. An influential example is Bradley's (1997) analysis of simple versus complex combinations of panels in rock art along the Atlantic coasts of Europe. Bradley found that the relationships between motifs on panels, and between panels and the surrounding landscape, implied both a particular "design grammar" which guided the creation of panels and a link between the relative complexity of those panels and the probable audiences to which the messages implied by the rock art were directed (1997:128-129, 148-150). A similar concept has been applied to Mediterranean Spain. Fairén's study of the rock art of Alcoy employed a similar concept in defining rock shelter types (2004*b*:7-8), expressed as the number of different styles found in the same locations. In the present study, complexity is investigated through plotting the relationship between the number of motifs and the number of different types of motifs occurring together at a single site (subsection 7.3.2).

7.3.1 Cross-tabulation

Table 7.15 is a cross-tabulation which shows the ratio of panels in which particular combinations of motif types occur, which can be labelled as type a and type b for convenience in this discussion. Each table cell represents the ratio of panels on which motif type a, represented in rows, occurs with motif type b, listed in each column, relative to the total number of panels on which motif type a occurs in the sample. In other words, each cell in table 7.15 answers the question "of panels with a motif type X, what proportion also have a motif type Y?". To read the table correctly, select a row, and move across the table to the column of interest. Note that the ratio reported in each cell is *not* reciprocal; that is, it is not a percentage of

Table 7.15: Motif category combinations by panel. Numbers in each cell are the proportion of panels with a given motif type, represented in rows, which also have at least one example of any other given motif type, represented in columns.

⟵ *Of panels with this motif type*	*Total Panels*	*This proportion also have this motif type ⟶* Amorphous	AnthPoss	Asexual	Female	Male	Bisected	Phi	PolyLobed	Circular	Bars	Crook	Curves	Grid	IdolLike	Lines	Ramiform	Bird	Boar	Bull	Caprid	Cervid	Equid	Quadruped
Amorphous	*37*	--	32	22	22	24	5	24	19	22	5	14	3	5	16	35	11	3	5	8	30	14	14	43
AnthPoss	*17*	**71**	--	41	29	41	12	41	29	35	6	18	12	18	29	41	12	6	12	12	47	24	24	**53**
Asexual	*14*	**57**	**50**	--	36	**50**	14	21	36	43	7	7	14	14	29	43	21	7	7	21	36	21	21	43
Female	*13*	**62**	38	38	--	**62**	**0**	8	0	31	**0**	**0**	15	8	8	31	**0**	**0**	15	23	38	38	15	38
Male	*14*	**64**	**50**	**50**	**57**	--	14	14	21	43	7	21	14	7	21	**50**	7	**0**	7	21	43	36	14	**57**
Bisected	*3*	**67**	**67**	**67**	**0**	**67**	--	33	**67**	**67**	**0**	33	**0**	**0**	**67**	**100**	**67**	**0**	**0**	**0**	**67**	33	33	**67**
Phi	*15*	**60**	47	20	7	13	7	--	40	20	13	13	**0**	7	13	20	13	**0**	7	**0**	40	7	13	33
PolyLobed	*11*	**64**	45	45	**0**	27	18	**55**	--	27	9	18	**0**	18	36	18	18	9	**0**	9	36	18	18	36
Circular	*15*	**53**	40	40	27	40	13	20	20	--	20	20	13	7	47	47	20	**0**	7	13	27	20	7	**60**
Curves	*2*	**50**	**100**	**100**	**100**	**100**	**0**	**0**	**0**	**100**	**0**	**0**	--	**50**	**50**	**50**	**0**	**0**	**50**	**50**	**100**	**50**	**50**	**100**
Bars	*3*	**67**	33	33	**0**	33	**0**	**67**	33	**100**	--	33	**0**	**0**	**100**	33	**67**	**0**	**0**	**0**	33	**0**	**0**	**100**
Crook	*5*	**100**	**60**	20	**0**	**60**	20	40	40	**60**	20	--	**0**	**0**	**60**	**60**	**0**	**0**	**0**	**0**	40	**0**	**0**	**80**
Grid	*3*	**67**	**100**	**67**	33	33	**0**	33	**67**	33	**0**	**0**	33	--	**67**	**0**	33	33	33	33	**67**	**100**	33	**67**
IdolLike	*9*	**67**	**56**	44	11	33	22	22	44	**78**	33	33	11	22	--	44	44	11	11	11	44	33	11	**78**
Lines	*17*	**76**	41	35	24	41	18	18	12	41	6	18	6	**0**	24	--	18	**0**	**0**	12	24	18	12	47
Ramiform	*7*	**57**	29	43	**0**	14	29	29	29	43	29	**0**	**0**	14	**57**	43	--	14	**0**	14	29	43	29	**86**
Bird	*1*	**100**	**100**	**100**	**0**	**0**	**0**	**0**	**100**	**0**	**0**	**0**	**0**	**100**	**100**	**0**	**100**	--	**0**	**100**	**100**	**100**	**100**	**100**
Boar	*3*	**67**	**67**	33	**67**	33	**0**	33	**0**	33	**0**	**0**	33	33	33	**0**	**0**	**0**	--	**0**	**67**	33	33	**67**
Bull	*6*	**50**	33	**50**	**50**	**50**	**0**	**0**	17	33	**0**	**0**	17	17	17	33	17	17	**0**	--	**67**	**50**	33	**50**
Caprid	*18*	**61**	44	28	28	33	11	33	22	22	6	11	11	11	22	22	11	6	11	22	--	22	28	**50**
Cervid	*11*	45	36	27	45	45	9	9	18	27	**0**	**0**	9	27	27	27	27	9	9	27	36	--	9	**64**
Equid	*5*	**100**	**80**	**60**	40	40	20	40	40	20	**0**	**0**	20	20	20	40	40	20	20	40	**100**	20	--	**80**
Quadruped	*24*	**67**	38	25	21	33	8	21	17	38	13	17	8	8	29	33	25	4	8	13	38	29	17	--

the number of panels which contain both motif types. For example, of panels which contain at least one female (of which there are 13), 62% also have a male anthropomorph. This does not indicate, however, that 62% of all the panels in the study area have both a female and a male anthropomorph; as the table shows, of panels with a male anthropomorph only 57% also have a female anthropomorph. Similarly, the rows are not cumulative: of panels with a female, 38% have an indeterminate (asexual) anthropomorph and 62% have a male anthropomorph, but both motif types do not necessarily occur with female anthropomorphs on the same panels. Instances in which panels containing a motif in the primary category also have at least one motif in the secondary category in fifty percent or more of cases, as well as those combinations which never appear together, are highlighted in bold in table 7.15.

Similar anthropomorph types have been grouped into female, male, possible anthropomorphs, and non-gendered anthropomorphs. The female and male groups include motifs which appear to have skirts in the case of female figures, while the male group includes archer figures. The "asexual" group includes anthropomorphs which lack gender characteristics (skirt, penis, breast, bow and arrow) but does not include ambiguous areas which are probably anthropomorphs but cannot be positively identified as such. Motifs in the latter category are called "AnthPoss", or possible anthropomorphs. Bisected arcs and anchor-like figures are included in the bisected group. Phi-like and poly-lobed motifs were left separate because of their ambiguous status as possible anthropomorphs and their distinctive characteristics. The circular motifs includes groups of dots, while the curved category includes non-specific curving lines. Ramiforms were left separate because of their distinctive character and possible identification as idols, especially motifs at Enredaderas and Los Cuchillos. Other potential idol-like design elements, including wavy lines, were grouped into the “idol-like” category. The zoomorph groups of bull, caprid, equid contain the "possible" motifs as well. The category of "quadruped" includes motifs which cannot be identified as to species as well as remnants of paint which are probably zoomorphs, but are ambiguous due to poor preservation.

Results of cross-tabulation

There are several interesting results which stand out from this analysis. First, amorphous motifs, which are found on 37 of the 61 panels included in the study, are found in proportions of 50% or higher for all combinations of motif types except cervids, and in this latter instance 45% of panels also have an amorphous motif. This indicates that while these amorphous areas are widespread and common, they do not occur with any particular motif as a matter of preference. Although there may be a cultural reason for the occurrence of amorphous motifs, it does not seem that they preferentially occur with other motif types. This may have some bearing on the assessment of the impact of differential preservation on the observed patterns.

Anthropomorph motif types are frequently found together, although asexual motifs are more likely to be found with male anthropomorphs than female. Phi-like figures are less frequently found with gendered anthropomorphs, although other bisected motifs are found with a male anthropomorph in 67% of cases (but never with a female anthropomorph). Poly-lobed motifs are never found on the same panels with female motifs, and rarely with males. Ramiform and other idol-like motifs follow a similar pattern, in that they are rarely found with other anthropomorph types, particularly females, with the exception of possible anthropomorphs (56% of panels with an idol-like figure also have a possible anthropomorph). If these types of motif are in fact types of anthropomorph, it seems possible that they represent concepts which are exclusive of anthropomorph gender.

Animal motifs are also often found together, but infrequently with idol-like, ramiform, or bisected figures including phi and poly-lobed motifs. Multiple species tend to occur on the same panels, particularly bulls with caprids, cervids, and unspecified quadrupeds. Other combinations of animal motifs tend to occur in ratios of less than 50% of the panels, except unspecified quadrupeds which are found with all other animal motifs in more than 50% of cases. The only combinations of anthropomorph and zoomorph motif types which occur together at this level, however, are boars with possible anthropomorphs and female anthropomorphs (reflecting the influence of the scene at Los Grajos), bulls with asexual, female, and male anthropomorphs, and equids with possible and asexual anthropomorphs. Cervids occur with both male and female anthropomorphs in 45% of cases, respectively. However, with the exception of the single bird motif at Cantos de la Visera, few zoomorphs occur with non-representational motifs such as bisected motif types (including poly-lobed and phi-like motifs), or any of the circular, linear, or idol-like motifs and ramiforms. This also suggests that the concepts represented by the non-representational motifs were portrayed in circumstances which excluded the figurative motif types.

While these patterns are potentially interesting, this analysis is not intended to provide a statistical evaluation of the strengths of these trends. A chi-square analysis was performed for each combination of motif types on panels, using the SQL methods described in chapter 5 to create a 2-by-2 contingency table for each possible combination. The results of this analysis are given in the first table in Appendix C. In some cases, the expected frequency was less than 5, necessitating the use of Yates' correction to produce a valid result. These cases are highlighted in red. Values over 3.84 represent statistically significant combinations (df=1, p=.05). In order to gain an understanding of the strength of these associations, the Phi coefficient (see chapter 5) was applied to the results which were significant. These results are reported in the second table in Appendix C. As mentioned in chapter 5, this test provides a measure of the strength of the association between the variables in each test, with values over 0.3 considered to be reasonably strong correlations. Interestingly, the combinations which prove to be statistically significant and strongly correlated are not necessarily the instances in which a high proportion of panels with motif a also have motif type b, as noted in table 7.15. The strongest correlations are the presence of male anthropomorphs with asexual and female anthropomorphs. This correlation is interesting in contrast to females, which are not statistically associated with any other motif. It is also of note that amorphous motifs are not statistically associated with any other motif, supporting the assertion that preservation is not a strong influence on the patterns observed.

7.3.2 Panel complexity

Complex and simple sites fall along a continuum when viewed in this manner, with no firm break. However, a preliminary count of the number of motifs present on each panel suggests that there are two, or perhaps three, levels of site complexity (table 7.16). The number of 15 individual motifs was chosen as the initial cut-off point because there appears to be a break in the frequency of motifs at this point, as the next highest number of motifs at a single site is 22. There is an additional break in frequency between sites with 55 and 85 motifs, respectively. As shown in figure 7.6, as the number of motifs present at a site increases, the number of different types also increases. This is consistent with results in similar studies which show a distinction between rock art traditions which appear to be totemic and those which are not (Sauvet et al. 2009:330). Such a pattern implies that the same symbols were used for similar purposes across the distribution of the motif types, and were not restricted to certain groups within the population, such as through use as clan symbols.

Table 7.16: Total number of types per panel compared to the total number of motifs present on each panel. Each square gives the number of panels to which both frequencies apply. For example, 9 sites have 2 motifs of 2 different types.

	Total number of motifs per site																						
Total number of types per site	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**22**	**27**	**30**	**40**	**44**	**48**	**55**	**85**
1	13	1																					
2		9	1	1					1														
3			5	3	2		1																
4						3	1	1			1												
5						1	1					1											
6							1	1			1		1				1						
7										1													
8										1				1	1								
9											1		1										
11																			1				
12																		1					
13																1		1					
17																				1	1	1	
22																							1

The results of cluster analysis 2, particularly cluster 4, are consistent with the suggestion that there was a distinction between complex and simple sites. Despite the widespread nature of each motif type in the landscape, as evidenced by the results of cluster analysis 1, complex sites form a distinct group which seems to be related to the combinations of motifs found. As seen in figure 7.7, there are clear trends in the motifs which can be associated with complex sites. Non-specific quadruped motifs, lines, asexual anthropomorphs, phi-like and male figures tend to be found in the complex sites, versus motifs such as cervids, female anthropomorphs, ramiforms, and idol-like motifs. These trends are consistent with those identified in the cross-tabulation analysis, and suggests that not only are certain combinations of motif types more common, but that they may have been associated with particular contexts.

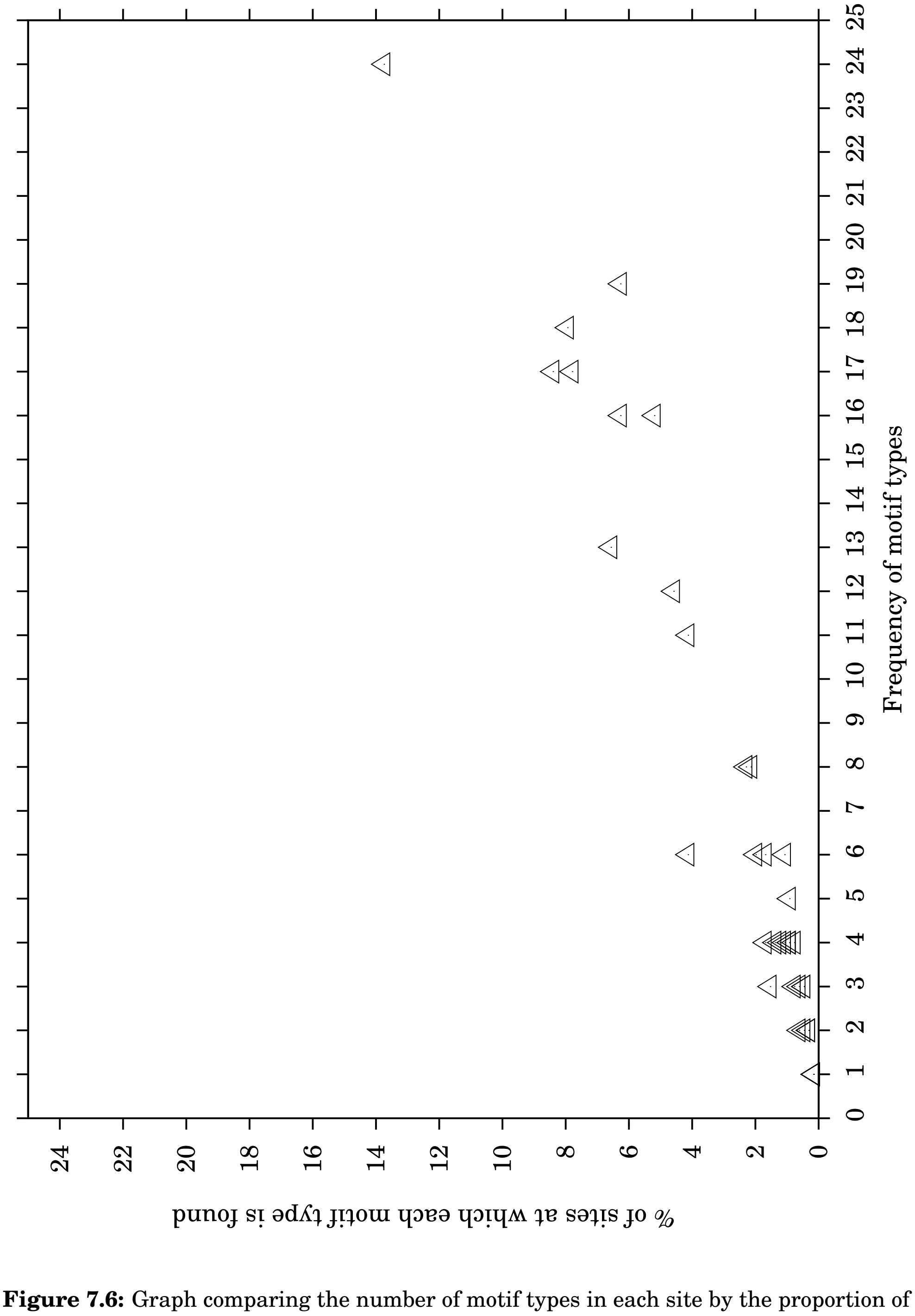


Figure 7.6: Graph comparing the number of motif types in each site by the proportion of the number of motif types in the sample found at each site.

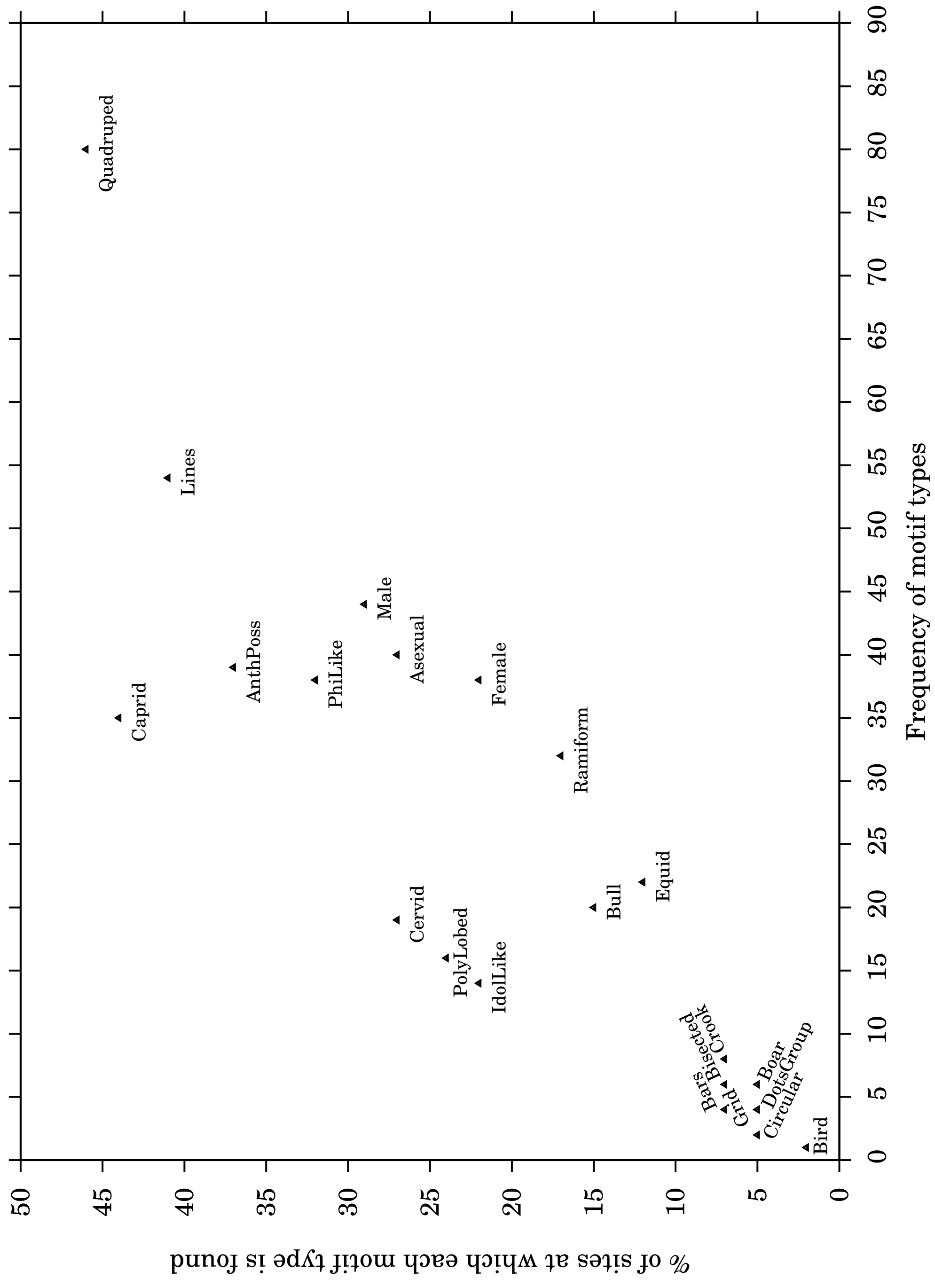


Figure 7.7: Graph comparing the frequency with which each motif type appears in the sample with the percentage of sites in the study area at which each type is found.

7.4 Motif types and landscape characteristics

Given the argument that the association between motif types and landscape characteristics is a reflection of an underlying world view, it is expected that there will be some observed trends in the frequency of occurrence as well as statistically significant associations between the landscape variables and motif types. This relationship is here explored using two methods. First, the simple frequency of each class is calculated, and presented in a series of bar graphs. Some trends are clearly visible, which implies a relationship. However, these trends are not necessarily statistically significant. A series of chi-square tests was therefore conducted, with the expectation that at least some combinations would prove to be significant. The chi-square tests were in turn applied at two levels. The first series of tests (see appendix B), the total number of each motif type occurring within the study area as a whole was However, there is a distinction to be made between patterns at the panel level and those at the site level. The first section reviews some of the patterns found when the number of motifs at each site were analysed, while the second set investigates the patterns by panel.

Some combinations of motif classes and landscape variables appear with different frequencies. Sites with wide vistas seem to be concentrated around the Altiplano area sites while restricted view sites are more prevalent in the Vega Alta sites. This may be a reflection of the deliberate selection of this area for the painting of different motifs. Sites with a wide viewshed have more motifs in general, except for bisected motifs (figure 7.8). Motif classes by site access also show a clear pattern of association (figure 7.9). There are many more of all motifs in easy to access sites, but the most striking difference is zoomorphs: nearly three times as many are found in easy sites as opposed to difficult to access sites (figure 7.10). This trend holds true for all classes, although the difference is not as striking for other motif classes.

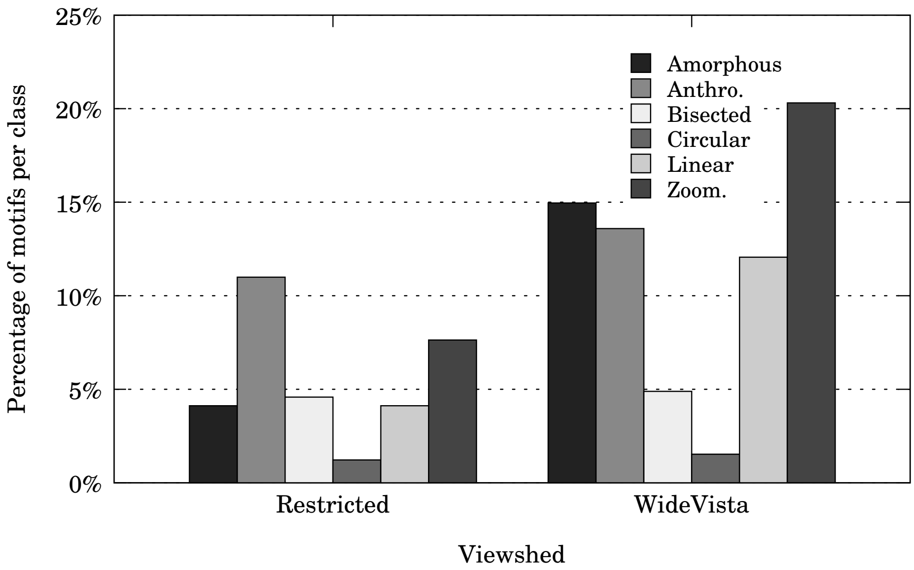


Figure 7.8: Percentage of motif classes by viewshed.

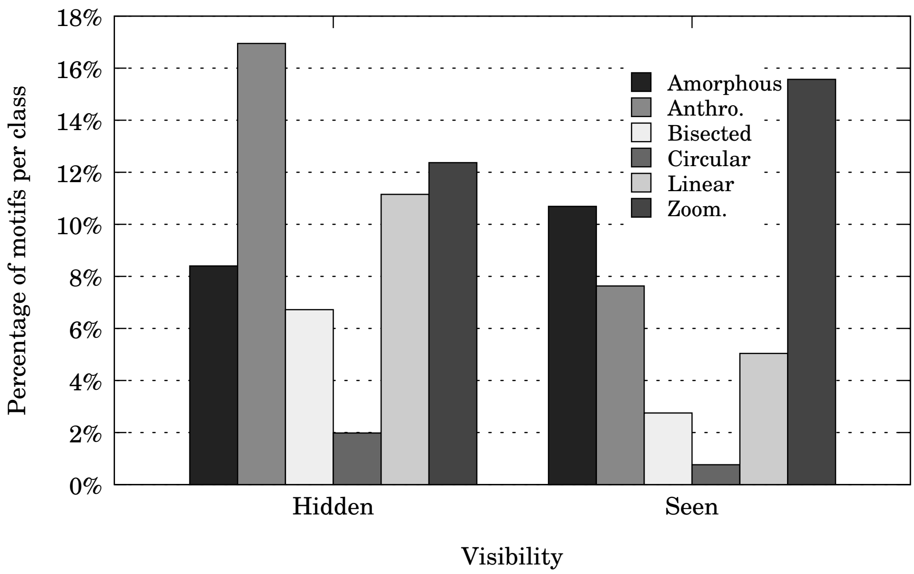


Figure 7.9: Percentage of motif classes by visibility.

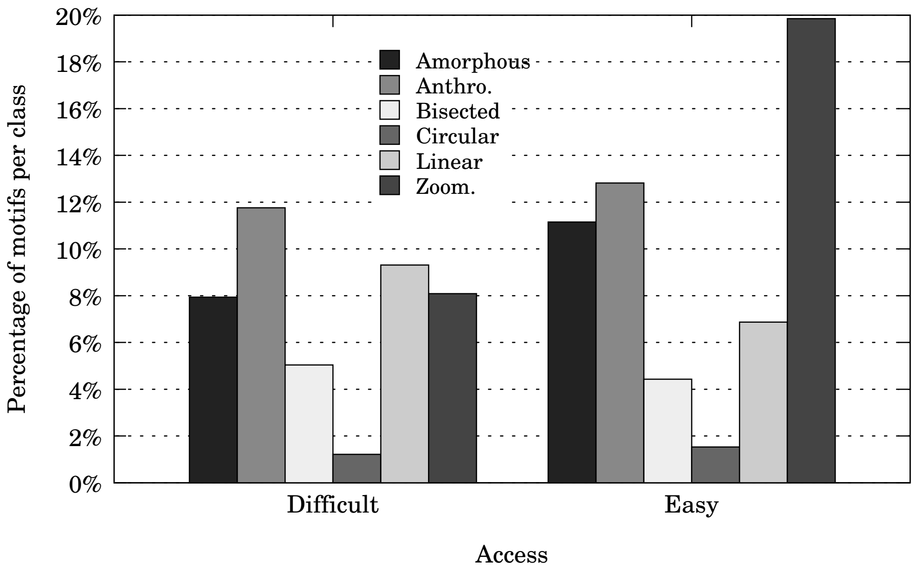


Figure 7.10: Percentage of motif classes by site access.

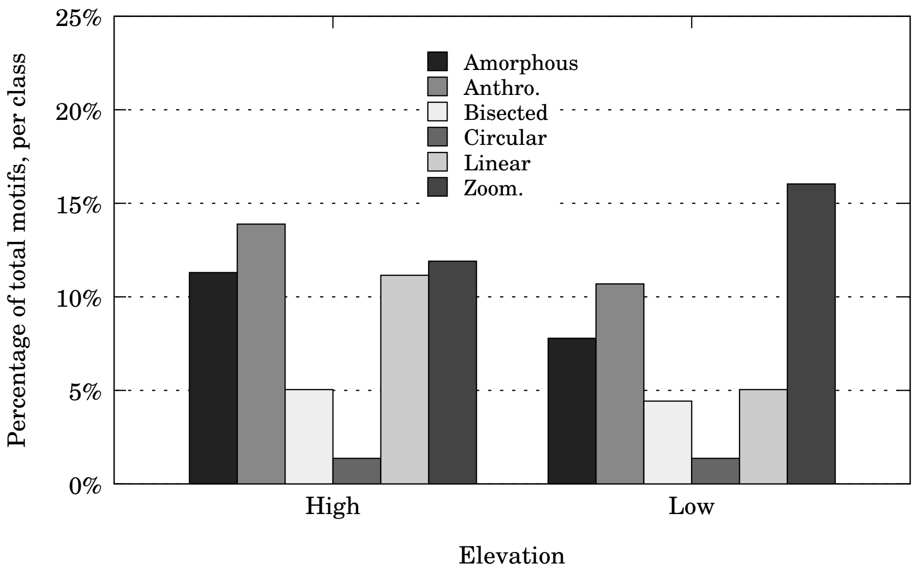


Figure 7.11: Percentage of motif classes by elevation.

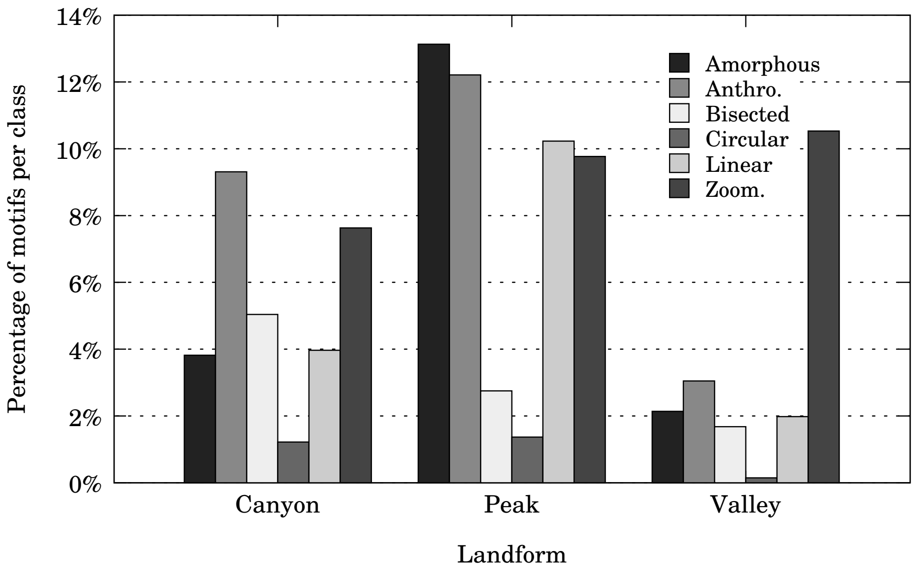


Figure 7.12: Percentage of motif classes by landform.

Anthropomorphs

Anthropomorph types also have a distinct distribution when compared to visibility (figure 7.13). Although anthropomorphs in general are more common in hidden sites, those with a distinct gender or other identity are more frequently represented in hidden sites. Figure 7.13 again shows clear differences in the distribution of genders. Anthropomorphs are in general more common in hidden sites, especially female, male, and phi-like motifs, as opposed to motifs with indeterminate genders. There appears to be a difference in the relationship of anthropomorphs of different genders relative to viewshed (figure 7.8). Indeterminate and possible anthropomorphs are more numerous in wide view sites. Specific genders and phi-like figures are more common in restricted view sites. Figure 7.14 shows the clear differences in distribution between gender classes and viewshed. Definite female and motifs are much more common in restricted view sites. Phi-like figures are much more common in restricted sites, while possible anthropomorphs are more often found in sites with a wide viewshed. Figure 7.15 again shows that the percentage of anthropomorph types vary by site accessibility, showing a similar trend to the other landscape variables. Female and male figures are more common at difficult to access sites, while phi like sites are fairly even. Indeterminate and possible anthropomorphs are slightly more common in easy to access sites.

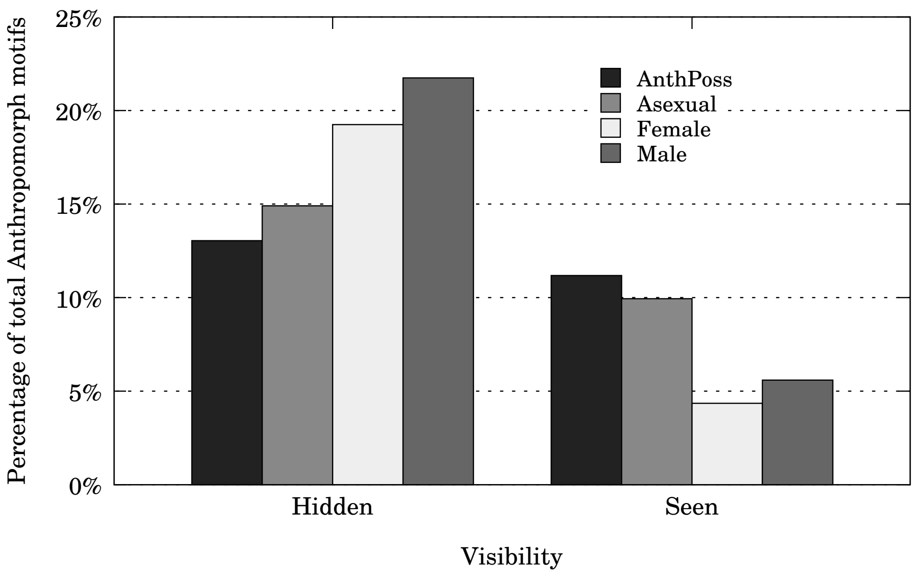


Figure 7.13: Percentage of anthropomorph types by visibility. Male category includes archer types.

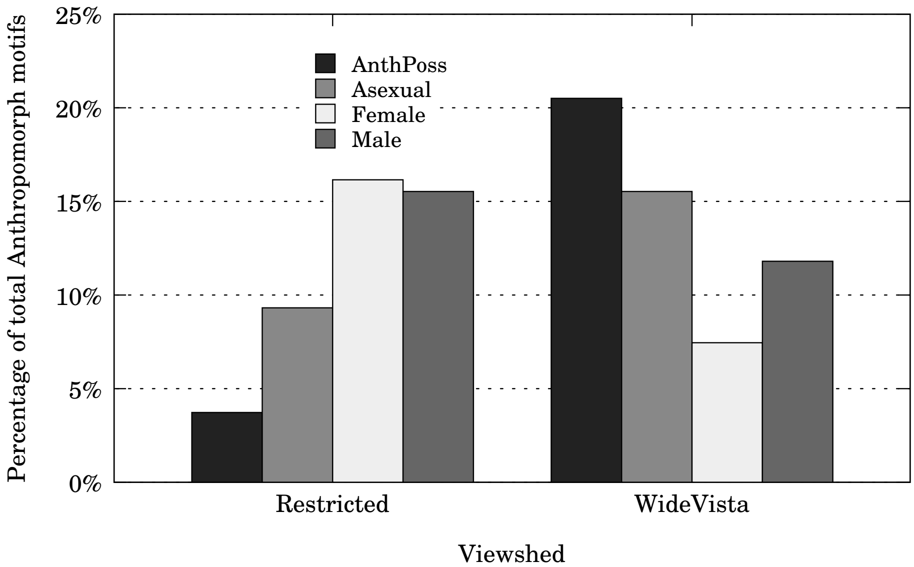


Figure 7.14: Percentage of anthropomorph types by viewshed.

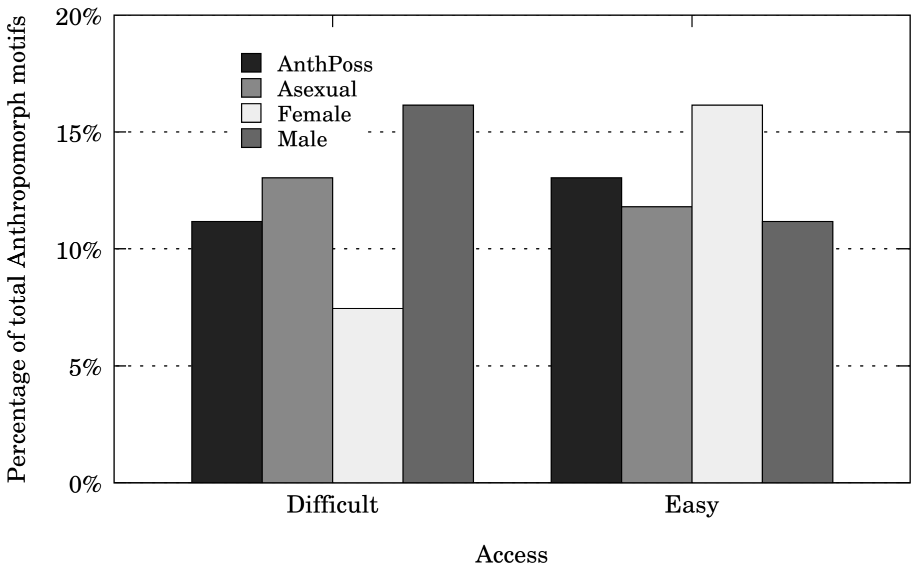


Figure 7.15: Percentage of anthropomorph types by site accessibility.

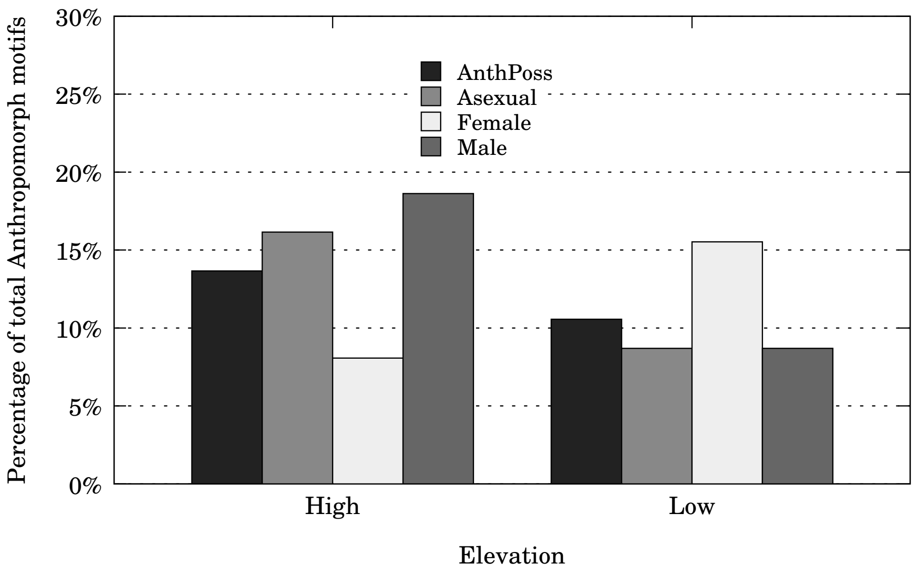


Figure 7.16: Percentage of zoomorph motifs by elevation.

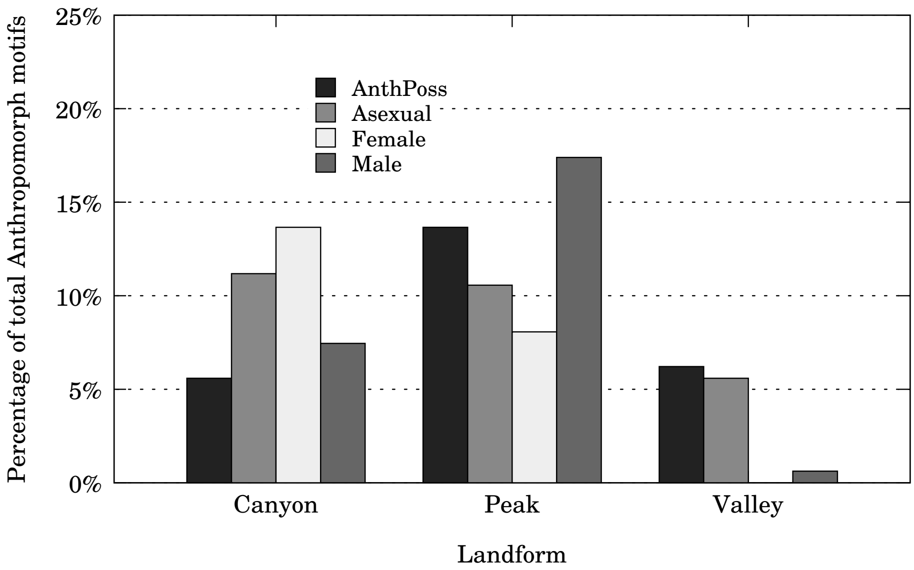


Figure 7.17: Percentage of zoomorph motifs by landform.

Abstract motifs

Bisected motifs are more common in hidden sites, as are circular and linear. Figure 7.20 shows the fairly striking contrast between hidden and visible sites. Abstract motifs are more common in hidden sites, but the number of various types of abstracts are rather different between hidden and visible sites (figure 7.20). Phi-like motifs, intersecting lines, and groups of lines are far more common in hidden sites, although poly-lobed figures are approximately equal. Circular motifs are mainly hidden, as are all rayed circles, most generic circles. Groups of dots, however, are evenly distributed. Abstract motifs again show a distinct distribution when viewed in terms of viewshed (figure 7.19). Circular motifs are generally rare, however, the only rayed circles are found in restricted sites. Generic circles are evenly distributed, while groups of dots are more common in wide view sites. Phi-like motifs are more common in restricted view sites, while other poly-lobed and bisected figures are more common in wide view sites. Intersecting lines, which includes crosses, are more frequent in restricted sites as well. Comb-like motifs are more common in wide view sites.

When viewed in class groups, the number of motifs in either wide or restricted view sites is fairly evenly distributed. Linear motifs are similarly more frequent in hidden than visible sites. Straight lines are fairly evenly distributed but crooks, curves, intersecting lines, groups of lines, and lines which appear to be projectiles are more common in hidden sites. Grids, comb-like motifs, nested curves, and wavy lines are more common in visible sites. The relative numbers of abstract motif types in restricted and wide view sites are shown in figure 7.19. The abstract motifs are roughly equally distributed. Intersecting lines are much more common at restricted view sites, as are phi-like motifs.

Figure 7.18 shows the frequency of abstract motifs in difficult or easy to access sites. Overall there are more motifs in easy to access sites, especially linear motifs, which are nearly twice as frequent in easy sites. Phi-like motifs are fairly evenly distributed, while intersecting lines are more frequent in difficult to access sites. Other striking differences are straight lines, anchor-like, comb-like, and crook motifs. Bisected arcs, grids, nested curves, and wavy lines are not represented at all in difficult to access sites, although these are all relatively rare motifs in general.

Phi-like motifs are much more common in restricted viewshed sites, but others in this class are more common in wide viewshed sites. They are also more frequent in hidden versus visible sites, and approximately equally frequent in sites that are easy or difficult to access. Circular motifs are fairly evenly split between wide and restricted viewshed sites, and easy or difficult access sites. They are much more common in hidden sites. Linear motifs are more frequent in wide than restricted viewshed sites. Comb-like and grid motifs, nested curving lines, projectiles, and straight lines are more frequent in wide viewshed sites, and all of the wavy or zigzag motifs are found in sites with a wide viewshed. Linear motifs are more common in hidden sites versus visible sites, and in easy versus difficult access sites.

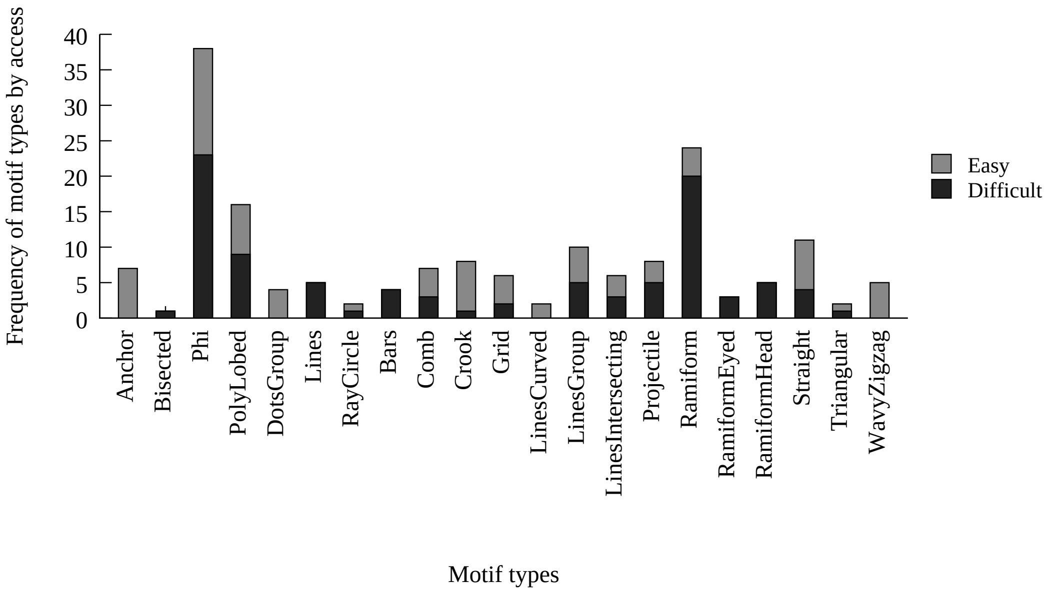


Figure 7.18: Frequency of abstract motifs in easy and difficult access sites.

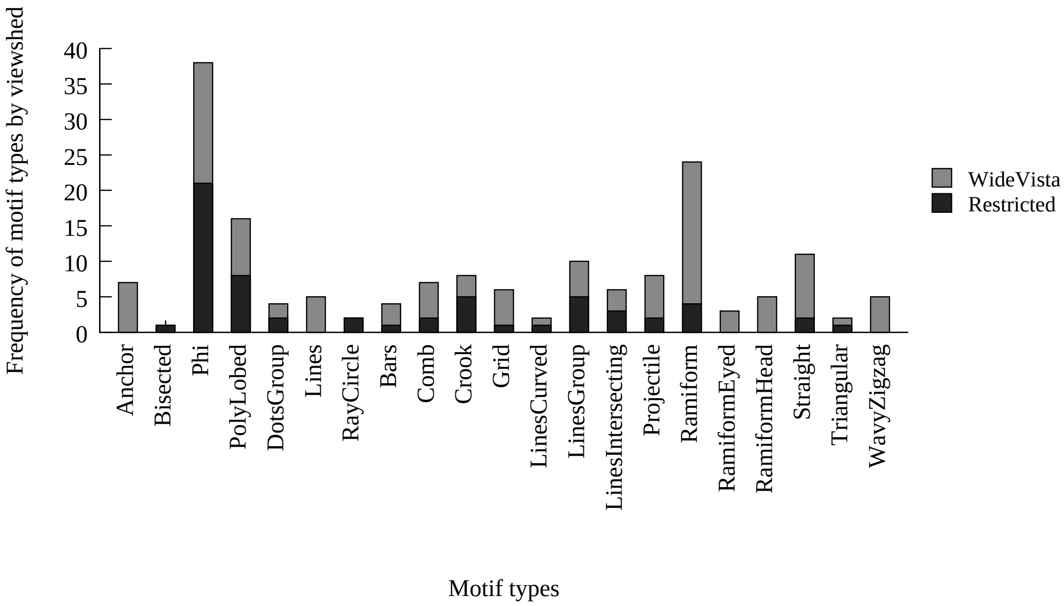


Figure 7.19: Frequency of abstract motifs in restricted- and wide-viewshed sites.

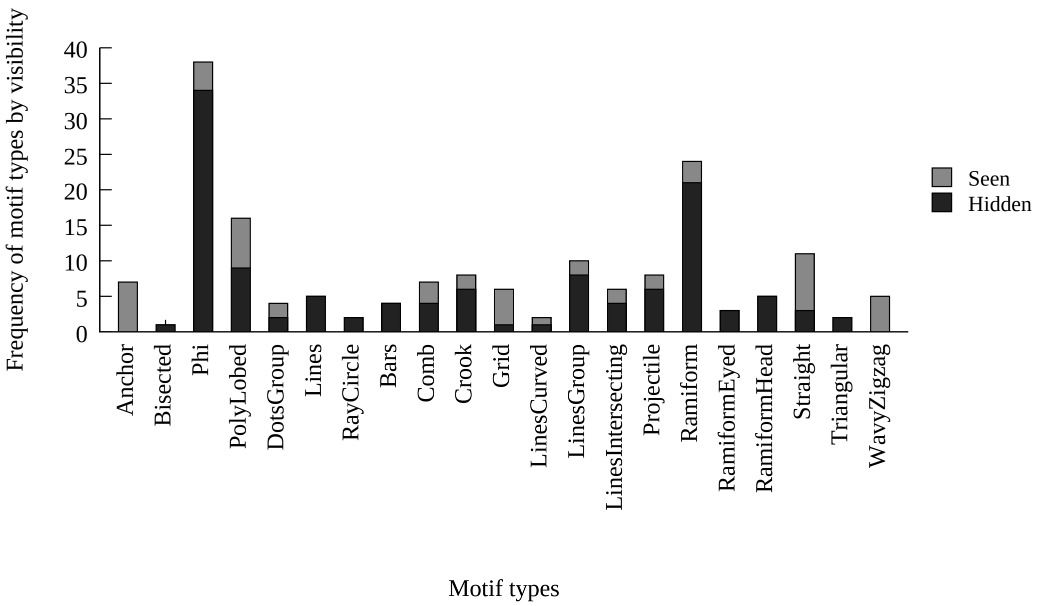


Figure 7.20: Frequency of abstract motifs in visible and hidden sites.

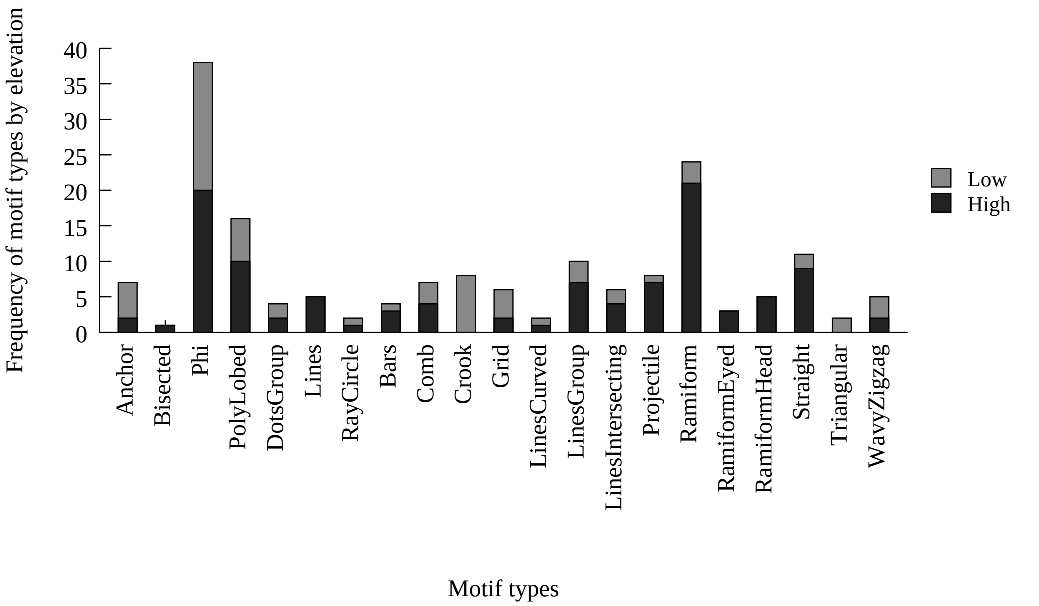


Figure 7.21: Frequency of abstract motifs in high and low elevation sites.

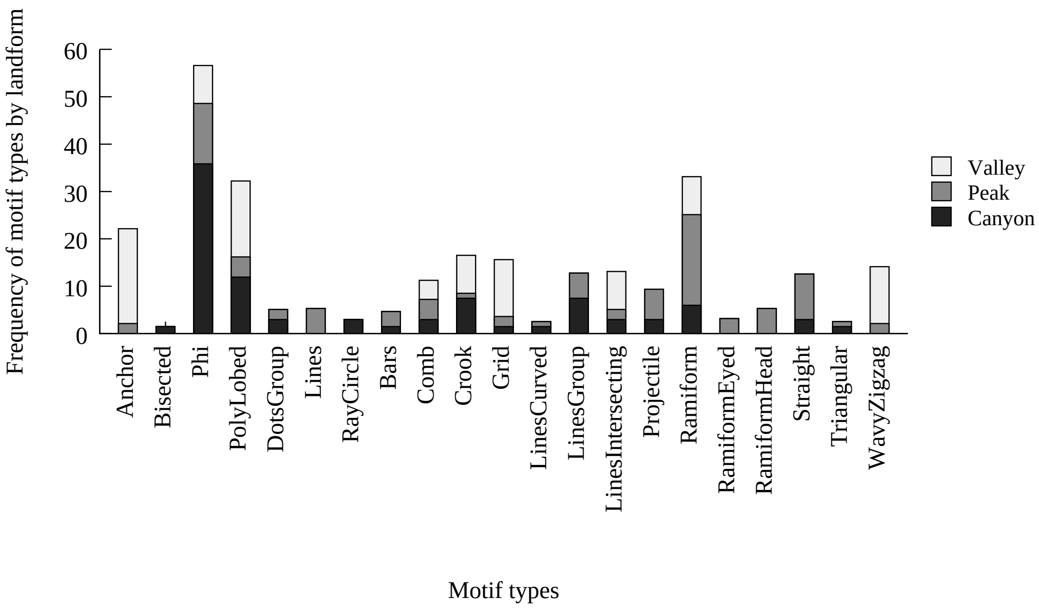


Figure 7.22: Frequency of abstract motifs by landform.

Zoomorphs

Zoomorphs generally seem to be more common in wide view sites (figure 7.9). There are fewer animals generally in hidden sites, but equids and caprids are more common (figure 7.25). Cervids and possible caprids are approximately equal, while possible zoomorphs and bulls are more common in visible sites. All of the possible boars are in hidden locations (Los Grajos I and Peliciego). However it is interesting to note the contrast between anthropomorphs in hidden versus visible sites.

All zoomorphs except caprids and boars are more numerous in wide viewshed sites (figure 7.24). Indeterminate motifs are particularly distinct, as there are nearly five times as many in wide view sites. There appears to be an overall preference for placing zoomorphs in easy to access sites, except in the case of equid motifs which are more often found in difficult access sites; however, as they are not widely distributed in the study area this may be misleading. Bull figures are found in only two difficult to access sites (Pico de la Tienda I, and Las Conchas), while the remaining instances are in sites with easy access. Possible canid figures are only identified at Cantos de la Visera and Mediodía, both of which are easy to access sites. Caprids (and probable caprids) are found in only three difficult to access sites, all in Almadenes canyon (La Serreta, 2, and 1 each in El Paso II and El Humo). The remaining caprids are located in easy access sites.

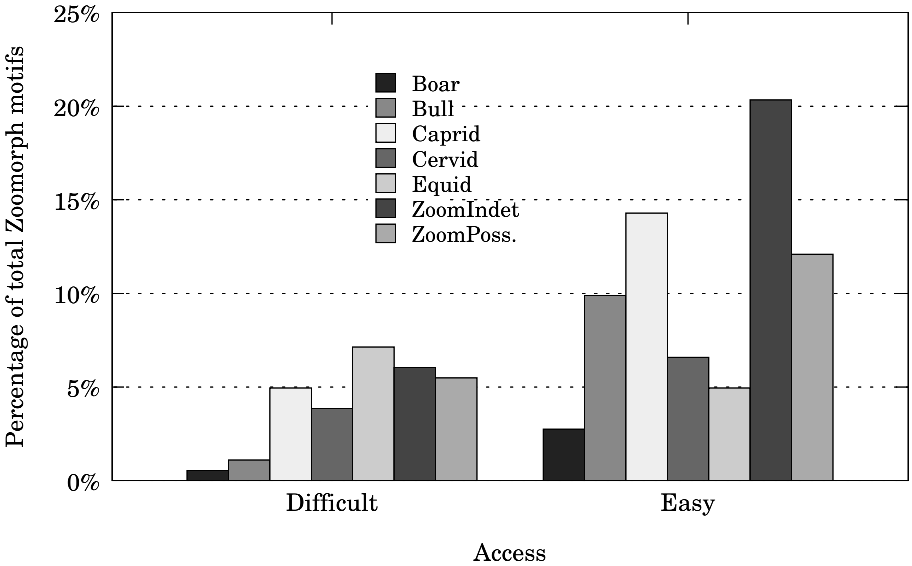


Figure 7.23: Percentage of zoomorph types by site access.

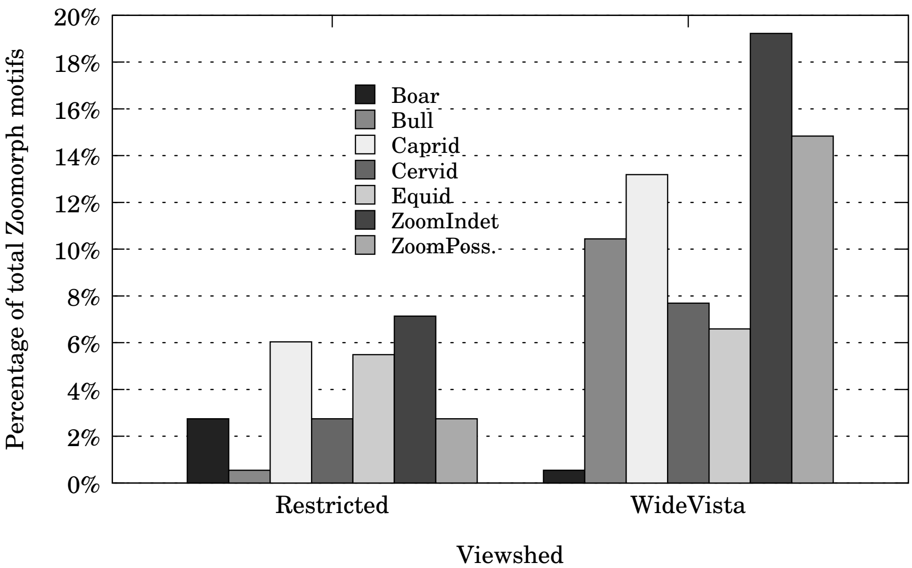


Figure 7.24: Percentage of zoomorph types by viewshed.

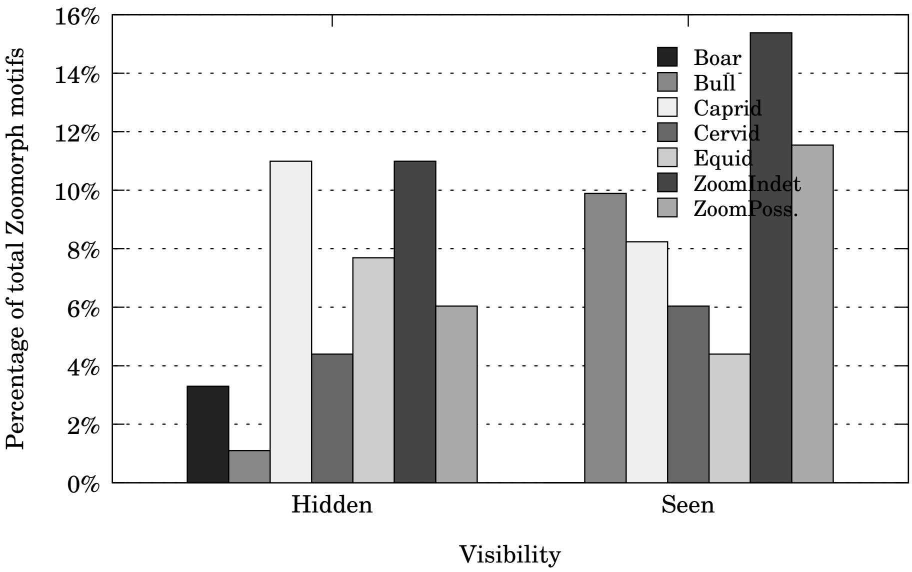


Figure 7.25: Percentage of zoomorph types per site visibility.

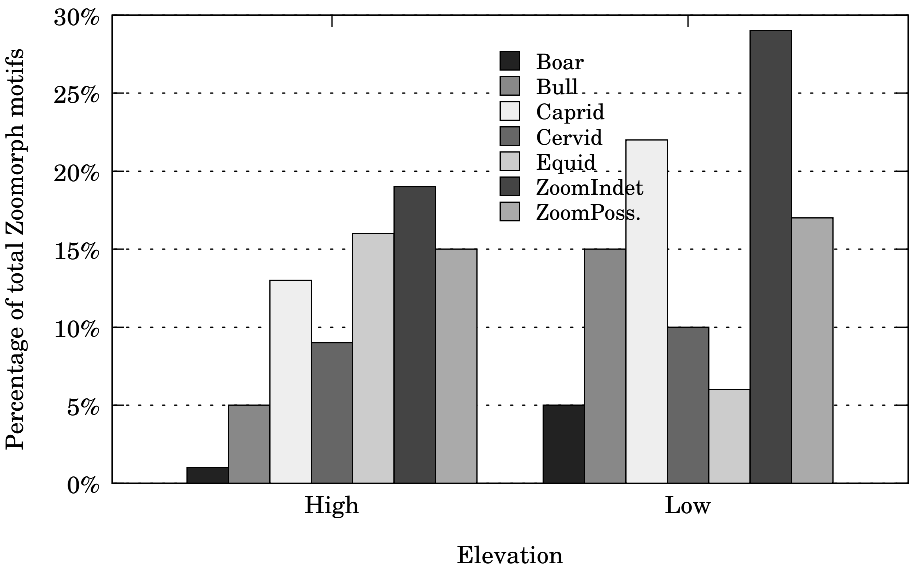


Figure 7.26: Percentage of zoomorph motifs by elevation.

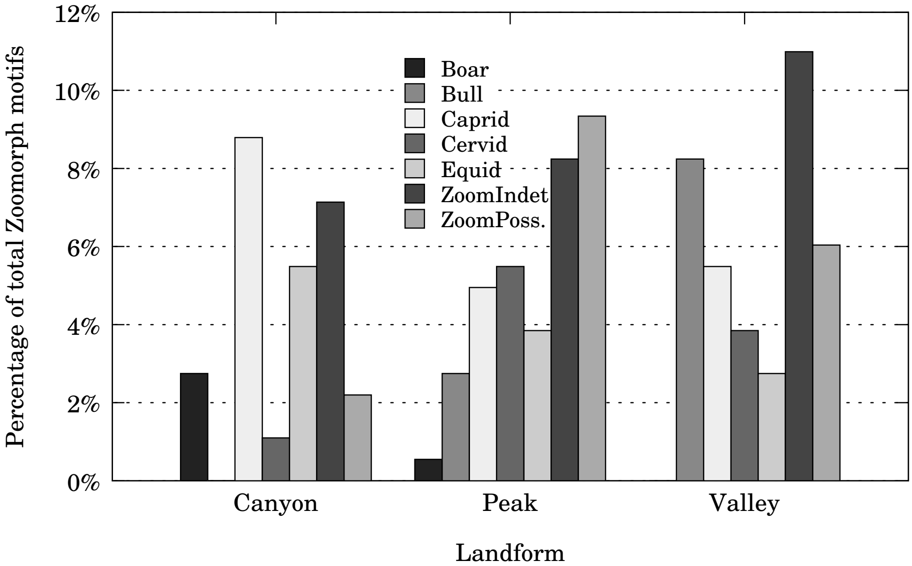


Figure 7.27: Percentage of zoomorph motifs by landform.

7.4.1 Chi-squared tests of independence

The patterns which have been suggested were also investigated using a comprehensive set of chi-squared tests. These were performed using a series of SQL queries which first created 2-by-2 contingency tables of all possible presence or absence combinations when compared to each landscape variable. In order to assess the significance of the patterns without the influence of sites with many or few motifs and motif types, these investigations were conducted at the level of panels. In other words, the results of these tests are not affected by the possibility of panels with large numbers of motifs, especially the same motif types, have a disproportionate effect on the statistical significance. To overcome issues of small sample size, the database queries were constructed in such a way as to automatically detect low expected cell frequencies and apply the appropriate corrections as noted in chapter 5. The results of this suggest that although frequency is an indication of preference, it is not always statistically significant. In the present analysis the chi-square results which were significant were then examined using the phi coefficient to gain an approximation of the strength of that association. The tables are presented in appendix C; however, the results are summarized here.

Analysis 1 compared the simple relationship of types together on panels. The combinations which were significant and relatively highly associated are the combination of male and female anthropomorphs (but neither with indeterminate gender anthropomorphs), bars with idol-like motifs, cervids with grids, and equids with caprids. However, the association of types and landscape variables were almost all found to be not statistically significant at the 95% confidence interval, although some are significant at 90%. These include the association of: bulls and visible sites, phi-like figures in hidden sites, accessible sites with caprids, female anthropomorphs, quadrupeds, and linear motif positively associated with peak locations. Caprids are slightly associated with high elevations, while cervids are negatively associated with canyons. Bulls and unidentifiable quadrupeds are not associated with canyon locations. Visible sites are significantly associated with bulls and phi-like figures but these calculations required corrections. Hidden sites are significantly negatively associated with phi-like figures. Amorphous motifs are strongly associated with canyon locations, while males are strongly associated with cave locations at the 95% confidence level. There were no strongly associated combinations with elevation. Style was also not found to be strongly associated with landscape variables, except for a weak association between hidden and Semi-Naturalistic sites, which perhaps reflects the Peña Rubia sites.

7.5 Amorphous motifs and preservation

As with any study of prehistory, it is possible that the patterns observed today have been negatively influenced by preservation issues. The occurrence of amorphous motifs in the study area can be used as a proxy measure of the quality of preservation generally, and the degree to which it affects the results of the analyses. Amorphous motifs account for 125 of the observed motifs in the study area. Some of these motifs are vaguely linear; however, they are impossible to classify further due to their ambiguous nature. Unlike examples in other parts of the world, where random pecking and areas of paint seem to be purposeful (for instance, some sites at the Piñon Canyon Maneuver Site, Loendorf 1989; Loendorf and Kuehn 1991), the amorphous motifs in the sample analysed here appear to be remnants of other motifs, rather than deliberate shapes. They may reflect the variable state of preservation of rock art motifs, although there is some possibility that there may be a cultural reason for this differential preservation. Other possible sources of damage include the use of some painted rock shelters as livestock pens (Cruz Berrocal 2004*a*:51), vandalism, or exposure to the elements.

The association of amorphous areas with other motifs as well as different landscape characteristics has some bearing on this issue. Examining the occurrence of amorphous motifs in each of the previous analyses implies that preservation has had relatively little influence on the patterns observed. In cluster analysis 1 (7.2.1 on page 189), amorphous motifs are found in relatively equal proportions across the identified clusters. As noted, the groups which result from this analysis seem to be related to landscape characteristics. The equal distribution of amorphous motifs in each cluster implies that the appearance of such motifs is not directly linked to the location in the landscape. The cross-tabulation analysis (subsection 7.3.1) supports the conclusion that poor preservation did not have a differential impact on the identified patterns. Amorphous motifs are found in a high proportion of the panels analysed here, and in combination with every other type of motif. This suggests that they were subject to the same preservation conditions as the other motif types, and that panels with amorphous motifs were not differentially affected by environmental factors. In the examination of motif type distribution (section 7.4) there is a slight tendency for amorphous motifs to occur in sites with wide viewsheds, high elevations, and easy access. However, when the statistical significance of these patterns are tested in terms of the presence or absence of types on panels, rather than the total number of motifs which are found in each context, this effect disappears.

The frequency of amorphous motifs in such locations is consistent with the view that the presence of amorphous areas is a product of the manner in which the site was used, rather than environmental conditions. Cluster analysis 2 (7.2.2 on page 193) supports this interpretation. Nearly all of the sites with amorphous were grouped into cluster 4. As discussed previously, this cluster contains the highest number of sites of all the resulting groups in cluster analysis 2, which collectively contain examples of nearly every motif type identified. Most of the sites in this cluster also contain multiple motifs and tend to be complex. The concentration of amorphous motifs in this cluster is most likely related to this complexity, as is the frequency of amorphous motifs in open, accessible sites. The continued re-use of such sites increases the likelihood that existing motifs will be damaged in the process of adding new images or perhaps in association with the activities which took place at the site.

7.6 Relationship between type and style

One of the criteria for assigning a motif to a given style is the theme which it depicts. As the Levantine style is largely figurative, it is not unusual to note that anthropomorphs and zoomorphs far outweigh any of the abstract classes. The Schematic style, on the other hand, is not exclusively figurative; however, there is a more equal representation of figurative and abstract classes within this style, although there are few circular motifs in either style. It is possible that the connections and patterns observed here are in fact a product of style, rather than motif type. There are several motif classes and design elements which transcend styles, however, which reinforces the difficulty with firmly assigning a given motif to a pre-defined style. This is particularly true for anthropomorphs, as there is a greater degree of ambiguity between Levantine and Semi- or Sub-Naturalistic motifs. Semi-Naturalistic anthropomorphs, such as those at Los Grajos or La Serreta, are rather different from the other more geometric or stick-figure body types which are normally considered to be Schematic (see Acosta 1968).

Additionally, motif types such as the phi-like motifs are often considered to be anthropomorphs, but there are few examples in the study area which actually seem to have the basic anthropomorphic characteristics of head, body, arms, and legs. On the other hand they are often found in the same sites but on different panels, and phi-like motifs are not always found with other Schematic style motifs. Defined fingers and toes are a distinctive characteristic of the Semi-Naturalistic paintings; however, such details are also characteristic of the Levantine style. Although some motif types are exclusively Schematic, namely the bisected motif class, linear motifs, phi-like figures, and ramiforms; none of the anthropomorph types or genders or zoomorphs appear to be exclusive to any style. This convergence implies that the patterns observed here are distinct from those revealed through a consideration of style alone.

Chapter 8

Patterns and connections

This chapter first reviews the main results of the analysis in chapter 7, then examines some of the issues raised by them. In particular, the results in the study area are compared to adjacent regions, particularly Alicante. The nature of ritual practice and its connection to world view is considered next, including a consideration of the mechanisms that may have underlain the emergence of rock art in the Neolithic. Finally, some suggestions for future research are offered.

Given that the complex relationship between landscape and the distribution of post-Palaeolithic rock art in the Altiplano and Vega Alta regions is here understood to be an expression of world view, embedded in the landscape, emphasis is given to possible social changes underlying the distribution of the rock art. Although recent studies examining this relationship have concluded that the distribution of rock art is an expression of social changes associated with the emergence of an agricultural economy in the Neolithic, regardless of the style of those images, researchers as a whole have nonetheless classified the images as belonging to one of three main styles as a primary analysis step. Classification at this level, however, does not take into account details such as animal species or anthropomorph gender, and only address variations in non-representational motifs to a limited extent. Further, several aspects of each motif class transcend style boundaries, especially animal species and anthropomorph gender. The results establish the nature of the distribution of rock art types in the Altiplano and Vega Alta regions. They also suggest new relationships, in that they show a connection between context and content from a perspective that has not been considered before. Finally, these analyses may be said to offer new insights into the distribution of rock art motifs in the area.

8.1 Review of main findings

The primary aim of this research was to explore the distribution of post-Palaeolithic rock art in the Altiplano and Vega Alta areas of Murcia in terms of 1) motif types which transcend the broad Levantine and Schematic styles, 2) the combinations of these motif types which are commonly found together, and 3) the relationship between motif types and specific characteristics of the landscape context in which the rock art sites are found. A series of analyses, using mathematical and statistical analyses including hierarchical cluster analysis, chi-square tests, and plots of relative frequencies were used to explore these dimensions. Style and landscape characteristics appear to influence the location of rock art, but these associations weaken when examined in more detailed terms. Certain combinations of motif types are often found together, a finding which is derived from both cluster analysis and cross-tabulation.

8.1.1 Motif combinations

Some motif types are significantly associated with each other: quadrupeds and linear motifs (ramiforms), and male and female anthropomorphs. Conversely, some combinations are rarely found, such as phi-like figures with specifically gendered anthropomorphs. Phi-like figures and other more obvious anthropomorphs are negatively correlated with each other, and are only significantly correlated with poly-lobed figures. Although there are a few examples where phi-like figures and anthropomorphs appear on the same panel (such as La Serreta), this overall tendency suggests that the phi-like figures may represent a distinct concept when compared to anthropomorphs in general. Non-specific anthropomorphs are positively correlated with caprids and equids, while linear motifs generally are frequently correlated with idol-like motifs, including ramiforms and wavy lines. The differences in combinations of motif types also suggests that it was appropriate to portray particular motifs together in certain circumstances and vice versa. The frequency of gendered anthropomorphs in particular kinds of locations in particular may have some bearing on the idea that it was not important to convey gender in some circumstances (Díaz-Andreu 1998; Dowson 2009). The anthropomorph types in visible sites may be depicting "people" as a generic category, while those in hidden sites depict women or men engaged in gender-specific activities. The association between gender and hidden sites hints at a concern for greater privacy, affording the painter the opportunity to explore the social aspects of gender. Ethnographic sources include examples of initiation rites or the meetings of religious societies which may be responsible for similar patterns (for example, in California; Whitley 1987, 1998).

8.1.2 Panel complexity

Site complexity is here considered to be a factor of the the frequency of motifs versus the number of motif types on a given site. This was investigated through cluster analysis as well as through plotting these dimensions against each other. There is clearly a continuum in this respect, in that many sites have very few motifs, while some sites have a very large number of motifs. This finding is consistent with other research on complexity (Conkey et al. 1980; Kintigh 1989; Sauvet et al. 2009) which suggests that as motif numbers increase generally, the number of individual types also increases. This pattern implies that motif types were not restricted to particular locations or groups, and that the symbols were generally accessible across the entire culture. This is in contrast to patterns elsewhere in the world in which motifs are restricted in their distribution, suggesting a totemic religious system (Layton 2000; Sauvet et al. 2009).

8.1.3 Motif types and landscape characteristics

The association of motif types with landscape characteristics was examined in two ways. First, the simple frequency of each class of motif relative to each landscape characteristic was calculated and presented in a series of bar charts. Several interesting trends emerge from this exercise. In terms of general class, anthropomorphs are more common in sites with wide viewshed, higher elevation, and low visibility. They are roughly equally distributed amongst landforms and accessibility. Bisected motifs are more common in hidden sites, with low visibility, difficult access, and higher elevations. Circular and linear motifs are found in similar circumstances, while zoomorphs are more common in sites with high visibility, easy access, low elevation, and wide viewsheds. Amorphous motifs are more frequently found in sites with wide viewsheds, easy access, and high elevations.

The most dramatic differences in the distribution of gendered anthropomorph types is the strong preference for hidden locations. Abstract motifs as a whole, including bisected, circular, and linear motif types, tend to be found in locations with restricted visibility and difficult access, especially phi-like figures and ramiforms. Zoomorphs, of most species, by contrast, are more often found in locations which are accessible and visible, with wide viewsheds. The exception to this is equid motifs, which are usually found in hidden locations. This pattern is consistent with the complexity and cluster analyses, in that complex sites tends to have many animal motifs, often of a relatively non-specific nature.

8.1.4 Chi square

Chi-square tests were performed using two different permutations of the data. In the first group of tests, the total number of motifs in each class was compared to the landscape variables in turn (see appendix B). Nearly every combination was statistically significant when viewed in this way; however, this result may be distorted due to the high frequency of some motif types at single sites, such as female anthropomorphs at Los Grajos I or animal motifs at Cantos de la Visera. An alternative chi-square test calculating only the presence or absence of motif types per site, and applying the Yates' correction for small expected values, did not find the same effects. Rather, the only significant landscape combination in this series of tests was the occurrence of Semi-Naturalistic motifs in cave sites. This series of tests also yielded some positive associations between motif types which occur together on panels.

8.1.5 Amorphous motifs and style

Finally, the distribution of amorphous motifs and the ambiguity between styles serve to reinforce these findings as products of motif type, rather than differential preservation or overall style. Amorphous motifs are used as a proxy measure of preservation, in that it is assumed that these motifs are the remnants of paintings, rather than intentional shapes. Given this, if amorphous motifs are found in greater concentrations in particular locations, this would imply a greater impact of weathering in those areas. However, an examination of the occurrence of amorphous motifs in each of the previous analyses suggests that this is not the case. Amorphous motifs are present in relatively equal proportions in cluster analysis 1 (subsection 7.2.1), and are found with every other motif type in the cross-tabulation analysis (subsection 7.3.1). This suggests that they were subject to the same preservation conditions as the other motif types. It may be that the occurrence of amorphous motifs is related to the use of a site, particularly repainting. In cluster analysis 2 (subsection 7.2.2), nearly all of the amorphous were grouped into cluster 4, which represents complex sites. The continued re-use associated with complexity implies that existing motifs are more likely to be damaged or obscured during the course of the activities which took place at the site.

The ambiguous nature of the three main styles of post-Palaeolithic rock art and the overlapping occurrence of some motif types within these styles indicates that these patterns of association are not simply products of style in general. Although one of the criteria used to assign a motif to a style is the class to which it belongs, these classes are quite generic. Some themes are common across styles, such as archers, females with skirts, stick figure humans, and all species of animals. Abstract motifs are more common in the Schematic style, as the name implies; however, some apparently abstract motifs have been assigned to the Levantine or Semi-Naturalistic styles. In addition to motif types such as females with skirts and male archers, other design elements, especially those which fall into the "idol-like" group, transcend both motif classes and styles. The mixed occurrence of styles on the same panels reinforces the appearance that location and motif type were more important than style.

8.2 Implications for post-Palaeolithic rock art research

The cluster analysis, complexity, and general frequencies all suggest that zoomorphs and non-gendered anthropomorphs motifs were generally more accessible symbols, probably in use throughout the social group as a whole. By contrast, motifs such as ramiforms and gendered anthropomorphs are found in a more restricted set of locations, implying that the concepts to which these motif types referred were available to fewer people or were used in special circumstances. The following discussion considers some of the circumstances in which rock art may have been produced, and offers some possible interpretations of the manner in which these circumstances may be linked to world view and a changing social milieu. First, the results in the study are compared to patterns elsewhere in the region, especially Alicante. Second, some possible connections with ritual practices are explored, including questions of complexity and types of religious practices. Finally, some of the problems surrounding the introduction of rock art in the Neolithic and the mechanisms which may have prompted this development are considered.

8.2.1 Comparison with other areas

In general, the rock art sites in the study area have a very similar distribution relative to the physical landscape as that reported elsewhere in the Mediterranean arch. Generally speaking, elevation, and landform have a low impact on the location of rock art sites. There is not much apparent emphasis on viewshed, with the exception of the larger, more complex sites. Many of the smaller sites, particularly those which feature gendered anthropomorphs, may in fact be hidden. Many of the sites are located in tributary drainages, away from the main open valleys and passes, and generally seem to be in the margins rather than central places that were part of regular daily activities. The impression of invisibility is heightened if one imagines a much denser forest cover which apparently prevailed until the Neolithic was well underway (Barton et al. 2004, 1994), which would have made locating most sites very difficult without prior knowledge (as is also the case in Alicante, Fairén Jiménez (2007)).

Although to a great extent the rock art in the study area is part of a broader tradition, and hence exhibits similar patterning, the region is nonetheless distinct. Consequently, the patterns here cannot be uncritically ascribed to adjacent areas, or vice versa. Adjacent regions of Murcia and Albacete, particularly Moratalla, have a much higher proportion of Schematic style images as compared to the Altiplano and Vega Alta areas (see Mateo Saura 1999). The terrain changes slightly as well, becoming more mountainous, with more permanent water sources.

These differences impact the relationship between people and the landscape, and by extension between rock art and the landscape. In addition, comparing the results of this study to adjacent areas is not straightforward.

The main difficulty in attempting to compare the sites in the study area with Fairén's rock shelter types directly is that the criteria and data are slightly different, partly due to the differences in style distribution. Namely, the Macroschematic style is only found in Alicante, while the Semi-Naturalistic style images are more prevalent in Murcia. The geological characteristics of the locations are also slightly different, especially the canyon sites in Almadenes and the small cave sites of Peliciego and the Peña Rubia sites. Sites in the study area which can be considered similar to the type 1 sites are Canto Blanco, Peña Rubia sites, and Cueva del Monje II and III. All of these sites may be associated with burials; Canto Blanco is near the Chalcolithic burial site of Molar I (Hernández Carrión 1993*b*:117), the Peña Rubia sites all had burials within the caves, and Monje II and III are near the site of Monje I which has burials, although no other archaeological remains were noted in the rock art sites themselves. However, the Peña Rubia sites do not fully fit the conditions, as they are located in caves, and Las Palomas is near the bottom of the slope. Other possible type 1 sites are Los Grajos III, which is small and associated with a burial, although the rock art is Semi-Naturalistic, the site is low rather than high, and does not have high visibility. Los Pucheros may be similar but is not associated with a burial and is Levantine in style.

Sites which are similar to shelter type 2 include Cantos de la Visera I and II and perhaps Los Grajos I and II; however, the location of the latter in canyons is different from the sites in the Alcoy area. Fairen's type 3 shelters are most closely equivalent to Collado de las Hermanas, Junco I and II, and Solana de la Pedrera, which appear to have the same features. Cejo Cortado I and II, Lomo del Herrero I and II, Mediodia, and Los Cuchillos are loosely equivalent to type 4 sites, as the Sierra del Ricote overlooks the Mula River and these site types may be linked to water in Alcoy. However, although both Mediodia and Los Cuchillos are classified as Schematic in style the motifs at these sites are atypical, which suggests they may not be expressing the same concepts. Los Cuchillos is associated with a burial, which suggests that it may be more properly considered as a type 1 site.

The Almadenes Canyon sites are perhaps nearest to type 4 sites, as they are difficult to access, near water, and predominantly Schematic or Semi-Naturalistic in style; La Serreta is of course complex, but the other sites do not appear to be. El Pozo I – IV is large, complex, Schematic, and associated with water; but it is not difficult to access. Pico de la Tienda I and II are in similarly difficult to access locations, but are Levantine in style. Finally, site type 5 seems to be the closest match for the sites of Buen Aire I and II, Gargantones, and El Milano.

A related problem is the recognized distributions and definitions of styles, particularly the possible extension of the Macroschematic style beyond Alcoy and the distinct nature of the Semi-Naturalistic style in Murcia. One problematic issue in the connection between the Macroschematic style and cardial ceramics is the restricted distribution of this rock art style. The unusual character of this style leads to two immediate questions. First, it may be that the distribution is not as restricted as it seems (Cruz Berrocal 2005*b*). Some motifs in other areas have similar features, particularly the large wavy lines and bars. Although the "idol" image at La Serreta (figure 6.20, page 141) is much smaller than the typical Macroschematic motifs, the unusual headdress and rayed lines surrounding the body are reminiscent of the figures at Pla de Petracos. This is potentially more significant if the "tiny schematic motifs" (Fairén Jiménez 2007:129) around the edges of the Macroschematic paintings in Alcoy were added at a later date, as may be implied by the differences in colour (figure 8.1; Hernández Pérez et al. 2004:29). If this is the case, then it may be that adding the fringed lines was part of the process of changing the identity of some figures. A similar practice has been noted elsewhere in the distribution of post-Palaeolithic rock art (figure 3.5).

Although several different types of Schematic motif have been described, there has been relatively little research on the identification of different phases of Schematic painting (but see Acosta 1984; Bader 1999; Hernández Pérez 2005, 2006). However, it seems clear that there are probably multiple phases within this tradition as well; the "wavy" motifs and ramiforms such as those at Los Cuchillos have much clearer parallels

Figure 8.1: Detail of anthropomorph with "fringes", Pla de Petracos, Alicante. Note the slight variation in colour between the main figure and the fringes. Detail of Hernández Pérez et al. (1994:57).

with Chalcolithic artefacts than the simple human and animal figures at sites such as Buen Aire, which are more readily associated with the Neolithic ceramics. There are also different forms within the styles but these are not necessarily limited to the Mediterranean region. For example, the cervid with comb-like antlers at Cantos de la Visera II is very much like examples from Tajo de las Figuras in Cádiz, or even Laxe dos Carballos in Galicia. This suggests links with later time periods, as well as broader cultural connections.

The tendency to find certain groups of motifs together more frequently than others may be related to this observation, particularly if Schematic motifs such as ramiforms are associated with a slightly later time period and consequent shifts in culture. The trends shown in the cross-tabulation analysis (subsection 7.3.1) include non-specific quadrupeds with ramiforms, generic linear motifs with other idol-like characteristics, and a separation between phi-like motifs and gendered anthropomorphs. If this is indicative of a chronological and cultural shift, the implication is that the characteristics which were considered essential changed over time. Or, in other terms, the importance of depicting particular species and genders declined as ritual practices changed. This is particularly intriguing given the possible association with Schematic motifs and Chalcolithic burials, as monumental burials are so frequently associated with changing claims to territory elsewhere in Atlantic Europe (Bradley 1997). However, there is no secure way to determine whether the meaningful characteristics of animals changed, or whether they are simply not accounted for by the motif types defined here.

8.2.2 Rock art and ritual

Landscape studies of rock art which focus on the GIS-based analysis of the environmental contexts and proposed ritual importance of sites suffer from the limitation that the "study of *sacred* landscapes is hampered by ambiguity in material clues to social meaning: we know from modern peoples that meaning in a landscape is not directly related to how obtrusively it has been marked in material, archaeologically detectable ways" (Knapp and Ashmore 1999:1-2). The mountain slopes in this region of Spain are dotted with rock shelters and caves of varying sizes, yet only a few have rock art or other signs of prehistoric use. Those that do often do not seem readily distinguished from the surrounding landscape or associated with obvious landmarks, and in some instances they seem to be hidden in side-canyons, rather than main valleys. This is consistent with Fairén's observations in Alicante that while rock art is often found in natural corridors, it does not appear to be associated with the overall landscape in a predominantly visual way -- either in terms of viewshed or inter-visibility (Fairén Jiménez 2004*b*,*c*, 2007). Fairén also found that in day to day activities did not centre on rock art, as evidenced by its isolated location and lack of visibility (or accessibility in some cases, especially Schematic art).

Shelters with low visibility were probably not meant to be visible at all. Some imagery may not have been meant to be public, which should be reflected by restricted visibility and access, even within a natural corridor or route-way between. Together with the relatively small size of the images, this suggests that they were largely hidden, rather than directed toward collective audiences. Thus some prior knowledge of the location of sites (or an extensive search) was necessary to produce the re-use observed at some sites. Visibility and access are also important in this respect, as they affect how people interact with the images.

Viewshed is related to territory aspects both in the senses of surveillance or defence as well as monitoring the resources within a territory (game movements, people, weather), or conversely by restricting the visual information about the surroundings which is accessible to the people at the rock shelter. However, the hidden quality is somewhat ambiguously defined. Some sites, such Monje II and III and La Pedrera, are "hidden in plain view". The shelters which contain the rock art are in fact visible from some distance, but are unremarkable and cannot be easily distinguished from a row of rock shelters with no known remains along a cliff in the same location (figure 6.11).

It is nonetheless clear that if the land can be understood as the "scenes where shared culture emerges" (Ball 2002:468), and rock art sites are a particularly visible example of this dialogue, then the differential portrayal of motif types both in terms of the characteristics of the site and the combination of motifs on panels suggests that the authors of the post-Palaeolithic rock art held a similar dialogue with the landscape, supporting the suggestion that differences in style are evidence of the outcomes of negotiations, conflicts, and performances connected with the emergence of the Neolithic social milieu. The differential distribution of motif types both on panels and in site types confirms the impression of an active ritual dialogue between the people and the place.

The nature of such a ritual dialogue is a long-debated subject in rock art studies. In recent years, the neuropsychological theory of shamanism in rock art (see papers in Lewis-Williams 2002) has dominated research; however, there are several studies which propose alternate ways of considering the ritual systems which underlie the distribution of motifs in the landscape. Comparative study of rock art traditions from several areas of the world (Layton 2000; Sauvet et al. 2009), for example, evaluated the distribution of different types of motif in order to distinguish between instances of rock art related to totemic, shamanistic, and secular rituals. Assuming that Kintigh's hypothesis that "if the motive for painting is the same at each site, and if all local groups share the iconography, one can predict that the diversity of motifs present will increase in relation to the number produced at the site" (Sauvet et al. 2009:330) holds true, an evaluation of the complexity of sites (measured as the proportion of types versus the percentage of the total number of motifs) should show an increasing complexity as the number of motifs present increases.

The hypothesis is that motifs which were used by only a subset of people (such as a clan totem) will only be found in certain sites associated with the clan territory, and frequently repeated within those sites. Shamanistic motifs, or those which are associated with generally available ceremonial powers, should be found in numbers approximately twice the average of motifs generally, and equally distributed throughout the landscape. The reasoning here is that while the use of totemic motifs is restricted to a particular group or clan and their territory, shamanistic motifs are generally available to members of all groups, and their distribution is correspondingly unrestricted. Similarly, secular art, or that associated with matters such as hunting charms, are expected to be distributed indiscriminately, because the concerns underlying hunting magic are universal in a given culture. Distinguishing between the latter two may be impossible, depending on the nature of the sample.

This idea is based in part on earlier research (Conkey 1990; Kintigh 1989) which evaluated the suggestion that some Upper Palaeolithic sites, such as Altamira, were places for seasonal aggregation events involving people from various related groups or clans coming together for a short time. There is a strong religious or ritual component to such gatherings, which is likely to have been expressed in a variety of media including rock art. Sites with a high diversity of motif types may reflect this type of activity. On the other hand, sites which have a large number of the same motif types may reflect the use of specific emblems restricted to a particular group. An example is the Tutunevi petroglyph site, which is associated with the seasonal Hopi "salt pilgrimage" (Titiev 1937). As people passed the site repeatedly over time they would add another symbol of their clan, which resulted in large numbers of repeated motifs on the site. In a sense this is aggregation over time, as people came to the site for a repeated, specific purpose, but the set of motifs is restricted according to the clan membership of the participants.

The diversity of Schematic motifs in Alicante (Fairén Jiménez 2007:134) suggests that these motifs were not always created by specialists or restricted to particular contexts, unlike Macroschematic or Levantine motifs. The ritual nature of these images is thus emphasized, particularly as a possible idiosyncratic expression of religious beliefs (as in shelters with very few elements in the same style). On the other hand, there are some hints that other ritual systems may have existed at the same time. In particular, there are some parallels between Macroschematic imagery, such as Pla de Petracos in Alicante and similar motifs at La Serreta, El Pozo, and Mediodía with traditions elsewhere which are thought to be shamanistic in nature.[1] For example, the raised hands, wavy lines, and rayed or bristled appearance of Macroschematic motifs is similar to some motifs in the Dinwoody tradition of Wyoming (figure 8.2), which is thought to have a strong association with the vision quest and other altered states of consciousness (Francis and Loendorf 2002). Other design elements, particularly the nested curves, parallel lines, and zigzags associated with carved bone idols and ramiform motifs are reminiscent of the entoptic forms identified by Lewis-Williams and Dowson (1988) as diagnostic of a shamanistic ritual.

It is interesting to note that in the case of post-Palaeolithic rock art, such design elements are frequently associated with burials, both in the form of grave goods and rock art. Comparing the distribution of these design elements to other motifs and forms of material culture may be instructive in evaluating the occurrence of potentially diagnostic design elements (see, for example Dronfield 1995, 1996; Lewis-Williams 2001). Given the results of the complexity analysis, which indicate that the rock art in the study area is not likely to be associated with a totemic religious system, the possibility of shamanistic practices is intriguing. Given the problems with the neuropsychological hypothesis, however, such an evaluation must be approached with caution (Díaz-Andreu 2001).

[1] I presented an earlier version of this argument in a paper entitled "Supernatural visions? Exploring parallels between the Macroschematic rock-art of Spain and the Dinwoody Tradition of the United States" at the British Rock Art Group Annual Meeting, University of Bristol. 2006.

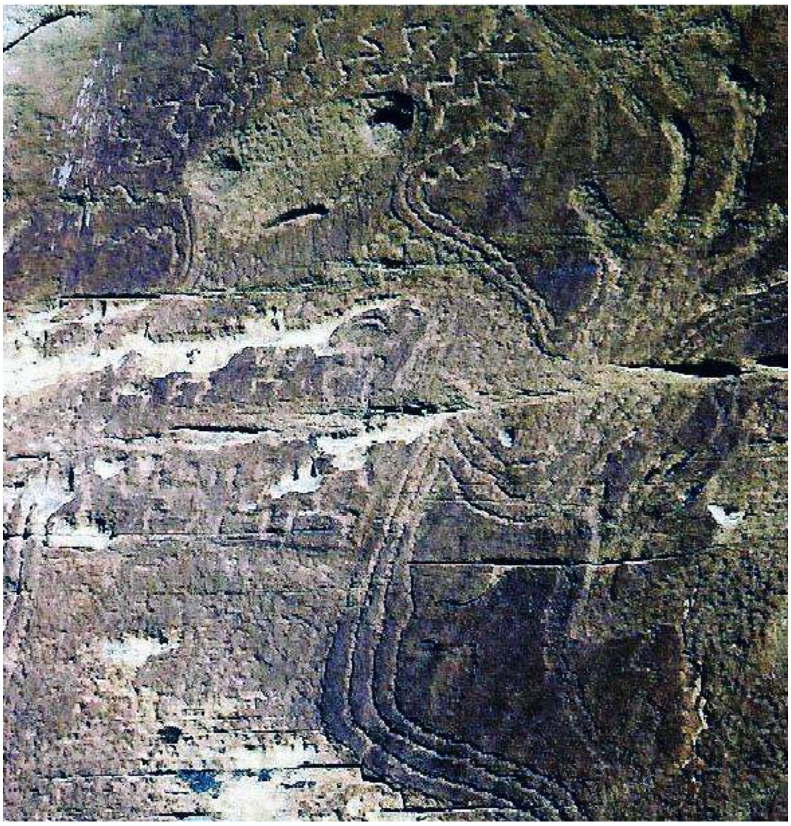


Figure 8.2: "Lightning Man" petroglyph, Wyoming. Note wavy lines surrounding figure and "rays" extending from the head. Enhanced from a photograph by Scott Burgan. Used with permission.

8.2.3 Depopulation and stress

One of the main questions which may be relevant here is explaining why such different styles, apparently made at roughly the same time and by roughly the same people, are found in such close proximity. The best chronological understanding at the moment is that the two styles were used to express different concepts, related to the changes in land use and social pressures associated with the start of the Neolithic. This answer is problematic, due to uncertainty about the nature of the emergence of the Neolithic. Although the notion of gradual change from a Mesolithic or Epipalaeolithic hunter-gatherer society to a Neolithic farming society has been very influential, the evidence has been mounting in recent years that this kind of transition is very unlikely to have taken place in the Mediterranean area.

Overall, the weight of the evidence suggests that people and things (domesticated animals and plants, ceramics) must have moved into the Iberian Peninsula from elsewhere, suggesting that some variation on the migrationist or island filter models, particularly the theme of rapid movement of farming peoples around the Mediterranean, is probably the right one. In turn, the idea of gradual acquisition and change in an existing hunter gatherer population seems implausible. Local populations of hunter-gatherers may well have traded and selectively adopted some new technologies from the incoming people through ephemeral trade networks (Cruz Berrocal and Vicent García 2007, but see McClure et al. 2008), but the gradual adoption and change model seems unable to adequately account for the evidence.

Increasing evidence (for example, Holtby et al. in press) suggests a Mesolithic population decline in some areas of the Mediterranean just before the advent of the Neolithic, possibly as the result of disease. This suggestion is consistent with the results of recent survey work in Valencia, which found that certain areas seem to have been unpopulated at this time (McClure et al. 2008). An immediately obvious analogy is the rapid and widespread depopulation in the Americas following the introduction of European diseases in the 1500s. Although the spread of European people and material culture may have been relatively slow, the more ephemeral trade networks and other contacts between neighbouring groups facilitated the rapid spread of infectious disease, leading to massive depopulation and related changes in culture, including changes in ritual life, and the distribution of cultural groups across the landscape. On the other hand, images of conflict in the rock art are very suggestive. Given the potential stresses caused when new populations began encroaching, such as those Mazel (2009) notes for the South African case, these images of conflict may not be entirely symbolic.

Group identity or ethnicity and territorial boundaries may be expressed in rock art, particularly the interaction of different groups separated by space or time. Such interactions are inherently political, in that they involve relationships of power, cooperation, and competition between groups. A shift in the economic base is a shift in power and status, which was probably actively resisted. It also comprises a shift in ideology and the character of the supernatural, which is again not always welcome. Ethnographic analogies have hinted at some of the possible political subtext of rock art (Lewis-Williams 1995) but there may be more ways to uncover these pressures in art. Establishing the absence of distinct ethnic groups or colonizers from outside the Iberian Peninsula does not necessarily mean that there was an absence of conflict over resources and territory, or significant resistance to economic and political change.

This notion of cooperation and territorial preservation in prehistory may be too idealistic or dependant on the assumption that these relationships were peaceful and rational, although humans often do irrational things (Webster 1996). The hints of rather sweeping economic change suggested by the adoption of ceramics, ideological change -- and possible friction -- represented by the contrast between Macroschematic and Levantine style art suggest that the possibility of conflict may still be relevant, even if there were no identifiable ethnic differences per se. The possibility of conflict and competition cannot be ruled out, given the prevalence of violent imagery (for example, see Nash 2005). It is not necessary to invoke different ethnic groups; conflict may have been between factions, competing clans, or other kin groups. In fact, rather than a vague sense of normalizing social relationships, rock art may be better understood as an expression of factional and religious competition in an atmosphere of profound economic and cultural change. Competition and resource pressure might imply an altogether more adversarial role for rock art.

As Mazel explains, such stresses may be related to changes in the rock art as the encroaching groups affected traditional settlement patterns and responses to conflicts, possibly beginning before any diagnostic changes in the material culture appear (Mazel 2009). An analogous process may have occurred in the Iberian Peninsula prior to the arrival of a new population and the introduction of new types and styles of artefacts and other items, such as domesticated animals. Given the breadth of the existing exchange networks in the South African case, it is likely that the hunter-gatherer community was aware of the spread of the agricultural groups, and the potential threat to their way of life, before these farming groups actually arrived in the area. Mazel cites several instances of the exchange of information and goods through similar widespread hunter-gatherer contacts, including Australia, North America, and a model proposed for Neanderthals in Europe. Crucially, as Moore (1985) argues, this impact on social relations may be felt more, at least initially, than threats to food resources. Another feature of hunter-gatherer social structure which may be of interest is the flexibility which allowed for multi-band aggregation. This facilitated information sharing, including the spread of new ritual ideas; I suggest that a similar mechanism could be responsible for the widespread development of the Levantine style and the sites with multiple episodes of painting.

The substantial differences in world view, land use, and social organization which characterize agricultural and hunter-gatherer groups (see Bradley 1997, for example, and works by Ingold 1986; 1988; 1996) would have impacted the movement of people (and perhaps game) through the landscape, residence patterns, and conflict resolution, possibly leading to an increase in ritual activity. Later ethnographic and historic information suggests that trance-related dances were important in enhancing group solidarity as a response to stress in similar circumstances. For example, the North American Ghost Dance can be seen as an example of a ritual which developed in similar threatening circumstances (see the account in Debo 1970:289-294).

Although the contacts between groups in the Mediterranean may have been too ephemeral to leave much of a trace, as McClure et al. (2008) suggest, the occasional occurrence of apparently Neolithic artefacts in otherwise Mesolithic levels may be accounted for by these ephemeral contacts without the necessity of a long and gradual development of a full-scale agricultural economy. This assumes that at least some of the sites which appear to show such a mixture are not simply the product of post-depositional disturbance or the re-use of old materials in later periods. If there was indeed significant stress in the Mesolithic, it might not be surprising that an intensification of ritual and internal conflict would occur, and perhaps be reflected in the rock art.

While the Levantine style images at sites such as La Sarga are clearly later than the Macroschematic motif because of their superimposition, implying that the Levantine style images were made during the Neolithic; the limited distribution of the Macroschematic may limit the extent to which this finding can be generalized across the entire area in which the Levantine style is found. It is possible that the Levantine style began before the arrival of actual Neolithic people and cardial ceramics, and is in fact associated with the Mesolithic hunter-gatherer population; scenes of conflict such as those in Valltorta could reflect these internal stresses. On the other hand, the depictions of arrows, bracelets, and baskets, all of which are Neolithic artefacts, strengthens the argument that the Levantine style dates to this time.

The use of superimposition to interact with older images (and the supernatural power they contain) has been suggested as a motivation for the destruction or alteration of prehistoric petroglyphs in the US Southwest. Several ancient Pueblo images at the site of Inscription Point in Arizona have been abraded and destroyed in the very recent past, notably masks and copulation scenes, and one serpent image has been altered with a chisel. While there is no conclusive evidence, it has been suggested that these alterations may have been motivated by political, cultural, or religious conflict, or part of an ongoing tradition of making and altering images at the site (Rogers 2007:62-63). Changing the species or identity of the original image suggests that perhaps this interaction was intended to negate older ritual power, rather than to claim it.

8.3 Future research

There are several possible directions for future research which suggest themselves. As with many such projects, one chief conclusion is the need for more data. While the limitations to fieldwork were not crippling in the present case, it is clear that there is more work which can be done in the study area. Recent discoveries, as yet unpublished, may also alter the conclusions drawn here. Other directions of study are also possible, especially the possibility of expanding comparisons with mobiliary objects and other site types. The following section outlines several possible research directions.

Despite the long and rich research tradition on post-Palaeolithic rock art in Spain, and the status of this body of images as a UNESCO world heritage site, there have been relatively few publications in English. The most recent comprehensive review is Beltrán Martínez (1982), although there have been many discoveries and much research since that time.

Several recent works exist, but a broader review, in English, of the state of post-Palaeolithic rock art research would be a welcome development.

On a similar note, additional fieldwork would be useful, especially given the existence of known but under-studied sites, such as those in Almadenes Canyon, or recent discoveries. In particular, the discovery of the site Riquelme in Jumilla in late 2009 could impact the conclusions, especially due to its unique character. Although few details have yet been published, photographs of some motifs published online by the newspaper La Verdad (García 2009) allow an initial impression to be given here. First, although there are said to be at least 50 motifs, only a few are visible in the photographs. The site is located in a small shelter, which, judging from photographs of work in progress, is located on a hillside. Further details about the location are not available. The motifs published in the newspaper article are composed of a series of dots in both black and red, with one cross motif (though not an obvious anthropomorph) and several other amorphous areas of paint.

Although other sites in the study area contain groups of dots (El Pozo and Buen Aire II) they are much less regularly arranged than those at Riquelme. The only other sites in this study which have both black and red motifs is Buen Aire II, which has a single black Schematic zoomorph, and Cantos de la Visera (II) which has a large black naturalistic bull motif. Bichrome or polychrome motifs are rare in post-Palaeolithic rock art in general, except in the sense that there are often varying shade of red or purple in motifs or panels which have been repainted or reused. The caprid motif at Los Pucheros and the striped or in-filled body figures at Los Grajos may be exceptions; however, multiple colours as an apparent deliberate aspect of a motif design is not often used in post-Palaeolithic rock art.

8.3.1 Photography methods

The results of photo analysis were unexpectedly productive, in that they revealed some new motifs which were not seen in the field. However, the intensive digital manipulation revealed the shortcomings of some of the photographs, especially those taken with the film camera as the film was not developed until after field work was complete. In future work a more streamlined method of working with digital images may be possible. The recent advent of inexpensive and lightweight netbook computers, capable of running JavaScript, and Secure Digital flash memory cards which are capable of transmitting images wirelessly from a digital camera directly to the netbook may be useful for future research. Such a combination could be used to set up the camera on a tripod, and using a wireless remote to control the shutter plus the wireless SD it would be possible to take photographs without moving the camera. These photographs could then be analysed on the spot using software such as ImageJ and DStretch, facilitating the identification of areas requiring closer investigation and perhaps photography using a macro lens.

8.3.2 Comparison with portable artefact deposition contexts

A future project could take a more comprehensive view of similarities across motif classes and attributes across a wider area, which would allow the inclusion of more details. For example, some anthropomorphic motifs in other areas, like Valltorta, have fringes on them, which may represent clothing, but also perhaps refers to a more widespread concept or idea. There may be a more widespread convergence between, for example, idols of various forms, in both rock art and portable artefacts. Common features such as triangular bone idols, skirted anthropomorphs, and chevron shapes in ceramics; "eye" shapes in ceramics and rock art and the similarity of some motifs to phi-like anthropomorphs, and the common occurrence of fringes and bisected transverse lines may link several concepts together which are otherwise obscured by classifying the motifs into classes and styles. Perhaps these details are the salient features or the motifs, and are a shorthand for something else.

Although this connection has been studied in some detail, there does not appear to be a study comparing the detailed depositional context of ceramics with the rock art sites and motifs. Ceramics may be associated with a variety of ritual and symbolic processes, from the selection of materials used as temper, the process of manufacture, the ritual consumption of specific foodstuffs, and perhaps the deliberate destruction of certain vessels after feasting or other events (Gheorghiu 2009). It may be useful to systematically study the depositional contexts of ceramics, especially Cardial ceramics, in detail, not only in terms of site location and stratigraphy, but also using a behavioural or life-history approach which examines the entire deposition sequence.

A similar approach has, in at least some North American cases, suggested that what seemed to be cases of trash deposition after the abandonment and burning of pit houses may have actually included specific ritual actions connected with the previous abandonment, rather than a simple case of tossing garbage into a convenient pit (Walker 1995). Similarly, there may be details of the contexts in which ceramics in Mediterranean contexts have been deposited which may suggest parallel meanings or activities, especially if the deposition of ceramics with specific motifs (such as animal or human figures) which have been regarded as similar to rock art motifs is systematically compared. Beyond chronological questions, such a project may shed additional light on the contexts in which particular symbols were used.

Plotting the location of settlements, burials, and other site types in an effort to identify "focal points" of local land use would help to place this rock art into its broader context. Additionally, better access to the sites themselves, or more comprehensive descriptions and publications, would allow for a more direct comparison of the northeast Murcia sites with Fairén’s rock shelter types (Fairén Jiménez 2006). Ideally, the analysis of distribution of motif types in the landscape would have included consideration of several other aspects of the archaeological record. However, due to practical problems accessing this data, and a general dearth of information, several potentially profitable sources of inquiry had to be eliminated from the present study. More details on the archaeological landscape context, including the distance and association to other cultural features and sites, especially excavated locations and sites with better chronological data would have been helpful. Generally speaking there is a lack of excavation data in the region. Although there are several projects which touch on this lack of data which are planned or underway, the results have not yet been made public.

8.4 Concluding thoughts

Alsonso may well be right that the Levantine style was produced by hunter-gatherers, as she and others have argued in multiple places (see papers in Various Authors 1999, for example), but the problems of identifying consistent styles across the entire distribution of post-Palaeolithic rock art limits the utility of this position, due to the regional diversity of images called "Levantine". As mentioned, Fairén's observations suggest that the overlapping distribution of styles indicate that there is no straightforward equivalence between rock art styles, ethnic groups, and territories. Fortea's (1974) idea that the Levantine style emerged or intensified as a response to incoming farmers may also be correct, and has a precedent in the South African case as well as the Australian case. It is possible that the Levantine style existed before the beginning of the Neolithic and the movement of farmers into the Iberian Peninsula, but the themes expressed and the intensity of use changed as the new population began to exert stress on the social systems of the existing group, which was presumably already under pressure due to environmental conditions (and possibly even population loss due to disease? See Holtby et al. in press). There are several sites across the distribution of Levantine style rock art which depict scenes of conflict, such as Cova Civil in Valltorta and Fuente del Sabuco in Moratalla. It would be very interesting to map the images of conflict together with the earliest dates of agriculture to see if there is a correspondence.

Chapter 9

Summary and conclusions

As noted in section 1.4, the primary aim of this research was to explore the distribution of post-Palaeolithic rock art in the Altiplano and Vega Alta areas of Murcia in terms of 1) motif types which transcend the broad Levantine and Schematic styles, 2) the combinations of these motif types which are commonly found together, and 3) the relationship between motif types and specific characteristics of the landscape context in which the rock art sites are found. This has been accomplished through a series of mathematical and statistical analyses, including hierarchical cluster analysis, chi-square tests, and the calculation of relative frequencies. The main objectives of the text as a whole were to:

1. Review the existing research on the rock art of Eastern Spain with particular attention to the major themes of style, landscape, and the emergence of the Neolithic (see chapters 2, 3, and 4);
2. Survey the rock art sites in the Altiplano and Vega Alta areas and compile a database of information about the rock art sites and individual motifs, derived from fieldwork, photographic analysis, and the review of published works as needed (see chapters 5 and 6);
3. Analyse the distribution of the rock art in terms of the combinations of motif types on panels and the association between motif types and the landscape characteristics of visibility, viewshed, general accessibility of the shelters, and location with respect to the surrounding terrain (see chapter 7).

This study focuses on the post-Palaeolithic paintings of Mediterranean Spain, specifically the Altiplano and Vega Alta areas of northeast Murcia. This region is of interest because it lies in the junction of several well-studied areas containing major concentrations of rock art, but has not been studied as a region in its own right. Recent work in Alicante and Murcia (Fairén Jiménez 2007, forthcoming) has suggested that the overlapping distribution of the two main post-Palaeolithic rock art styles is a product of different but contemporary functions or uses of rock art sites, related to changes in land use as the Neolithic agro-pastoral economy emerged, in contrast to the traditional interpretation of these styles as evidence of distinct ethnic groups or time periods. Because the contrasts in the images and the contexts in which they are found are here understood to be an expression of an underlying world view, including the social changes and negotiations related to changing land use as the Neolithic developed, it is expected that some details of the rock art will be associated with particular characteristics of the landscape in a patterned way.

The application of the concepts of style and type in rock art studies, and some of the issues which arise in the context of post-Palaeolithic rock art studies, are discussed in chapter 2. Although the images have been classified using multiple typological schemes, the application of these existing classification systems to the exploration of the relationship between rock art and landscape across the entire distribution of post-Palaeolithic rock art is limited in some important respects. First, systems which focus on details specific to particular regions or which focus exclusively on a single style, such as Acosta (1968), Alonso Tejada and Grimal (1996), or Domingo Sanz (2004), are not sufficiently generic to be applied to other areas or styles. Conversely, typological schemes which group the images into broad styles or classes, such as Cruz Berrocal (2004*b*) or Fairén Jiménez (2002*a*), lack the detail necessary to examine the links between landscape and motif variability within or similarity across the main recognized styles. Accordingly, a new typology which transcends the main styles, and is specifically tailored to fit the rock art in the Altiplano and Vega Alta regions, was created (described in chapter 5).

The chronological position of post-Palaeolithic rock art and its relationship to the emergence of the Neolithic is in important topic in the history of research in this area, and is outlined in chapter 3. Current evidence links the similarity between rock art styles and portable artefacts associated with the Neolithic, especially cardial ceramics, and later objects, such as carved bone idols and arrow points. Although this chronology is disputed by some authors, the evidence currently available is not sufficient to challenge the generally accepted view that the main rock art styles are roughly contemporary, emerged in the early Neolithic together with cardial ceramics, and are associated with a single cultural group using style to express different concepts. Although the chronology remains disputed, despite many years of writing on the subject (Baldellou Martínez 2001:13), there is little new evidence and the controversy remains unresolved. While it does appear that the three major styles recognized in post-Palaeolithic rock art as a whole -- Macroschematic, Schematic, and Levantine -- cease to be made at different times, this thesis follows Cruz Berrocal (2004*a*) in taking the position that the best-supported understanding is that all of the post-Palaeolithic rock art styles emerge in the early Neolithic, without a clear end date.

Given this understanding of the chronology, it is reasonable to suggest that the distinctions in the kinds of images found and the kinds of places in which they are located are a product of an underlying world view which associated different meanings with specific styles and motifs. Chapter 4 discusses how studies of rock art distribution elsewhere have made similar connections between the placement of imagery and world view, particularly in the context of cultural change, and reviews some of the known patterns of distribution in post-Palaeolithic rock art.

The methods of data collection and analysis are described in chapter 5. First, the selection of the study area and field work procedures are described, including photograph processing and the characterization of the landscape context in which the sites are found, particularly the visibility, viewshed, accessibility, and general topographic position and land form. Second, the methods of statistical and mathematical analysis are described, and finally, the process of creating a modified motif typology is discussed. This typology, created in order to circumvent the issues noted in chapter 2, is created using a method modelled on Loendorf's research elsewhere in the world (Francis 2001; Francis and Loendorf 2002; Loendorf 1989; Loendorf and Kuehn 1991; Loendorf and Porsche 1985), which is in turn based on traditional archaeological methods (for example, Adams and Adams 1991; Hill and Evans 1972) of exploring the formal attributes which occur together in a given group of images. The landscape characteristics and motif types identified form the basis of the analysis in chapter 7, beginning on page 170.

The results of field work and the analysis of photographs is reported in chapter 6 (beginning on page 119). The discussion includes example illustrations of the motifs found at each site, and an overview of the imagery and the general characteristics of the site. This includes details about supplemental sources of data where appropriate, and a discussion of any discrepancies between field observations and the work of other authors. The sites are first divided into two sections by according to modern political boundaries, then discussed in loose alphabetical order or in groups where several sites are located in close proximity.

Chapter 7 on page 170 gives the details of the analyses performed on various aspects of the data. The motif attributes which have been identified are presented, and the frequency with which they are found is tabulated. Several potential ways of dividing the motifs are explored, and the implications of each method are described. The sites in the study area are categorized according to the landscape context in which they are found (as defined by the combination of variables each site exhibits). These types were then analysed at the panel level to identify common themes and the details which comprise them. Finally, the distribution of types was examined at the level of sites and the wider landscape, to determine whether particular motifs or themes are associated with different aspects of land use. The analysis proceeds in four phases: 1) a discussion of the frequency of motif types and design elements, 2) hierarchical cluster analysis of the motif types present on sites, 3) investigation of the relationships between motif types at the panel level using cross-tabulation, and 4) a consideration of the frequencies of motif classes and types relative to the overall landscape variables. Consideration is also given to the occurrence of amorphous motifs, and the subsequent implications for issues of preservation. Finally, the relationship between type and style is addressed.

Briefly, the results indicate that style and landscape characteristics are significant factors influencing the placement of rock art at a general level, but these associations become less clear when the rock art is examined at a more detailed level. On the other hand, an examination of motif types rather than styles reveals several interesting patterns. Motif types are frequently found with specific other motif types, including linear and idol-like motif type, non-specific quadrupeds with ramiforms, asexual anthropomorphs with caprids and equids, and male with female anthropomorphs. Some combinations are also interesting because of their rarity, such as the tendency to find phi-like figures and other anthropomorph types on different panels. Chi-square tests of the presence or absence of styles at the site level and the landscape characteristics did not result in any statistically significant associations, with the exception of the occurrence of Semi-Naturalistic motifs in cave sites. Nearly every other landscape combination was significant when the total number of motifs of each class was calculated (see appendix B); however, it is possible that this effect was distorted by the high frequency of some motif types at single sites, such as female anthropomorphs at Los Grajos I or animal motifs at Cantos de la Visera. An alternative chi-square test calculating only the presence or absence of motif types per site did not find the same effects.

The complexity of the sites in the study area was also investigated by plotting the frequency of motifs versus motif types. There are clear trends in this respect, with many sites containing very few motifs, and a few sites with a very large number of motifs as anchors along a continuum. The widespread nature of the motif types implies that the use of particular motif types was not restricted by location, suggesting that these were symbols which were generally available and not the specific emblems of clans or similar groupings. Finally, these patterns do not seem to have been greatly distorted by either preservation issues, as indicated by the indiscriminate distribution of amorphous motifs, or by broader style boundaries, given the ambiguities of these styles and presence of motif types which transcend them.

9.1 Limitations of data and scope

As with any project, there are a few important limitations to the analysis presented here. The primary limitation is the focus on the local scale. While this is a deliberate choice, the patterns which have been identified cannot be necessarily be generalized to other regions. Additional data and alternative analysis methods may expand and enhance the results, particularly the use of different field techniques to enhance the visibility of the motifs (see subsection 8.3.1). Health and safety limitations to the sites which could be visited must also be taken into account; given the results of photographic analysis in other locations it is possible that new motifs could be identified in the sites which were not visited. Finally, the relative lack of data from excavations and field walking surveys limits the conclusions which can be drawn about the overall archaeological context in which the rock art is found. These limitations will be discussed in this section, and possible means of ameliorating them are discussed in section 8.3.

Chi-square tests were performed to evaluate the statistical significance of the relationship between motifs and landscape characteristics at the level of style, class, and type. These were performed in a series of tests which compared a given set of variables with another (for example, the occurrence of motifs of each class compared to site accessibility). In all cases the null hypothesis was that the two variables were independent. The details are given in the supplemental appendix; however, the null hypothesis was rejected in all cases except the following: class compared to elevation, anthropomorph gender and site access, "superstyle" (combining Semi-Naturalistic and Schematic) and site access, viewshed, and class; and zoomorph types compared to landforms. These results generally support the position that the placement of particular motif classes and types in specific locations was not random, as most other combinations of variables appear to have a statistically observable effect on the occurrence of the other.

Class does not seem to be related to elevation, which suggests that at a more generic level the choice of motif is not observably affected by elevation. Anthropomorph gender is not apparently predicted by the ease with which a site can be accessed. The independence of style, access, and viewshed supports the impression that these characteristics of rock art sites were not the determining factors which influenced the use of particular styles of painting. Style, in the sense of either Levantine or Schematic, is also found to be independent of class, which suggests that the effects observed in this study cannot be solely explained by the style to which individual motifs belong. Finally, zoomorph types are independent of landform, an indication that there is no preference for particular locations in this sense.

However, in this case the chi-square test considered rare motifs, such as bird and boar motifs, as separate variables. As a result, some expected frequencies were quite low, and the test generally is unreliable. In some cases the expected frequencies are calculated to be less than 5, is a commonly accepted minimum threshold value for valid chi-square tests. This is particularly problematic in cases which compare motif types with low frequencies, such as boars, or high frequencies of particular motifs at a single site, such as Los Grajos I. For this reason the association between motif classes and landscape variables was also tested in terms of the presence or absence of a given motif type on each panel, which reduces this effect. Secondly, this series of chi-square tests was performed using an SQL database which automatically applied Yates' correction for small expected values where necessary, and calculated the Phi coefficient test of the strength of association between variables. This resulted in fewer significant associations, but suggests more meaningful correlations.

If a wider survey area, and a larger number of motifs, had been included then the attribute definition and analysis methods described in section 5.4 and section 7.1 could be applied to create a new global motif typology. However, this approach can be problematic in that the more sites which are included and the wider the geographical area in which they are distributed, the more "diluted" the patterns become. There is a risk that the original problem of a classification system which does not capture important dimensions of variability sufficiently to derive any useful conclusions about the distribution of the rock art will simply be perpetuated if the size of the research area is expanded. Cruz (2004*a*; 2005*b*) noted this effect in her analysis, in that she found patterns of distribution at the local scale which were not apparent in the wider distribution of post-Palaeolithic rock art.

In a similar case, Taçon et al. (1996) found that the Rainbow Serpent motifs in Australia are fairly homogeneous across their distribution and the different time periods. However, when differences between locations (different banks of the creek) were examined, it became apparent that they could be separated into two groups based on differences in the tail attribute, which was confirmed to be related to the gender of the Serpents and to a particular mythological theme. Both examples suggest that more data do not necessarily lead to more meaningful results; rather, that details are important. Although there is clearly an element of related-ness in the distribution of rock art traditions, which presumably reflects related language and cultural groups; as argued elsewhere (chapter 2), important regional distinctions can be lost if the classification systems are too broad or generic.

Some of the sites which can only be reached by experienced climbers have not been published in any detail, as noted in chapter 5. While basic information is available this is limited to a cursory and terse description of the motifs which omits potentially important details. In many cases the presence of post-Palaeolithic rock art could not be verified due to the deteriorated state of the panels, although it is clear that paintings of some kind were once present. However, it is possible that a more thorough investigation including digital enhancement of the photographs could reveal additional details, much as was the case at Los Cuchillos (Díaz-Andreu et al. forthcoming *a*). Because of the lack of access, some details were not collected for all sites, and the research questions were refined in order to focus on those details which were available for all the known sites in the study area. In initial field visits, the number of panels in each shelter was noted, for example, as was inclination of each panel and the height of the lowest figure above the current floor. As this information was not available for all of the sites it was dropped from the analysis. However, the position of the rock art on the wall may have implications for chronology (Alonso Tejada and Grimal 1996), and could be incorporated in future work. A related issue is the lack of details about the overall archaeological and cultural context. Where information is available, this was mentioned in the discussion in chapter 3; however, this information would benefit from additional survey and excavation projects.

Some potential variables were not investigated due to the aims of the study; however, they may have had an impact on the selection of locations for painting. There has been at least one study which shows that the colour of the surfaces on which rock art is created may be related to the ritual significance of the images (Díaz-Andreu 2003). This may be related to the apparent association with unusual local features and natural monuments as noted by Cruz Berrocal (2004*a*) and Torregrosa (2000-2001). The natural features which influenced the site selection may not necessarily have been similar across sites but there may have been a similar preference for rock shelters with an unusual apperearance or associated with prominent features. In the study area the sites of Cantos de la Visera I and II, for example, are atypical formations. At several sites the paintings seem to be preferentially located in smaller alcoves, often on the left side of the shelter as viewed from the opening. Although this was not systematically investigated due to the small number of sites in which it was observed, this pattern was noted at El Milano, Cueva del Monje II, and Pico de la Tienda II.

Further possible associations include features of the rock surface such as small holes and steps, although this is not consistent. For example, while the bent-over anthropomorph at Los Grajos II (figure 6.34 on page 153) clearly seems to have been painted in a manner which reflects the location in a small alcove as well as under a step in the rock face, and the large "idol" motif at La Serreta (figure 6.20 on page 141) seems to be emerging from a crack, other paintings such as the cervid on panel 1 at El Milano (figure 6.44 on page 165) seem to have been painted without regard for such features. It may also be that other features which were important to the creators of the rock art are not obvious to modern observers (Ashmore and Knapp 1999; an example of such non-obvious marking of specific places includes small cairns and arrangements of pebbles in Australia Lance 1998).

9.2 Review of contributions

The primary contribution or finding is that there are indeed patterns in the distribution of motif types, both in terms of the combinations of motifs which are found on panels and in the landscape groups. The distribution of post-Palaeolithic rock art in the Altiplano and Vega Alta regions is a factor of a complex relationship between the landscape and the people who created the rock art, which cannot be summarized in terms of style alone. As the survey in chapter 6 and the analysis in chapter 7 demonstrates, there are multiple facets, variations, and patterns of significance which cannot be fully explained by the classification of the images as either Levantine or Schematic, even if the Sub- or Semi-naturalistic styles are taken into account. Although future research may prove that there is a further chronological dimension to these styles, at present it is clear that the locations in which they are found were used for multiple purposes over time.

Second, this study offers an alternative perspective on methods of evaluating the connections between landscape and rock art. No studies which systematically evaluated post-Palaeolithic rock art in terms of the occurrence of particular combinations of motif types on panels could be located. By focusing on the design elements which make up the individual motif types we are able to see this more clearly. The lack of strong correlations between simple categories suggests, however, that this relationship is complex. The styles which have been defined clearly capture important similarities and differences between images; however, it is not always clear how a given site or motif should be classified. In order to facilitate the investigation of the multiple ways in which locations were differentiated through the selection of both imagery and location, a more detailed classification is needed. Although other typologies and classification systems have been defined for post-Palaeolithic rock art (see section 2.2), they are not necessarily applicable to other regions or research problems. In some instances the distinctions between types are ambiguous, and the diagnostic criteria for each type are not well defined. Another factor is disagreement about the entity represented by a given motif, which is a particular concern when discussing anthropomorph gender. For these reasons, a new motif typology is defined for the images in the study area. It is explicitly recognized that this typology is not necessarily applicable to other study areas or research questions, but rather is designed to address the specific characteristics of interest in this thesis.

Although iconography was addressed to some extent in recent studies, due to the goals of those studies the motifs were separated into fairly broad groups. While it is difficult to verify any claim that a given type of motif was in some sense more important than another, there are some types which seem to be linked to broader ritual and religious themes (especially ramiforms or eyed idol-like motifs), which are of particular interest in the present study. These motif types were not given special attention in previous work, rather, abstract "signs" and similar motifs were considered as a group (for example, Cruz Berrocal 2004*a*, 2005*b*). Other research has examined the incidence of animal, human, or abstract classes and their relationship to the landscape; however, these considerations were applied to each style group rather than to the images as a whole.

The problem with these broad but fundamental divisions is twofold. First, there are many stylistically ambiguous images, and it is not always clear why a given image has been described in the literature as belonging to a particular style. Indeed, some styles, namely the Semi- or sub-naturalistic, have an ambiguous relationship to the more commonly identified Levantine or Schematic styles. The Semi-naturalistic, which includes, for example, the images at Los Grajos and La Serreta, has been considered a variation on the Schematic. However, there are some aspects which are more similar to Levantine style images elsewhere, such as defined fingers and shaped bodies, clothing or jewellery. By contrast, the relatively heavy lines which comprise the images and the limited range of postures support a closer association with the Schematic. In the broad regional studies that have been done, however, the Semi-naturalistic style images have not been studied as a distinct group, and it is not always clear whether they have been considered to be Levantine or Schematic.

By contrast, in the present study the motifs were first described according to class. Variations within each class were explored in order to suggest ways of combining and analysing the motifs, and the frequency with which each design elements were found was tabulated. This approach differs from previous research on the relationship between post-Palaeolithic rock art and landscape context in that it employed a more detailed typology, considered association between motif types at a level beyond class, and associated these types with the landscape directly, as well as considering motif types as a group across style, rather than grouping them by style first. The process of analysing and examining the motif types did reveal that there are interesting variations in the motifs which are normally subsumed under style or broad class designations. While this is not to say that these systems are ineffective for the purposes they were developed for, in keeping with the view of the typological process described in chapter 5, the results of the present study do confirm that there are other valuable means of examining these motifs. Further, there has not yet been a study which specifically examines the Altiplano and Vega Alta areas as a single unit. A more in-depth understanding of this area will facilitate future comparison with other regions of Spain, especially with findings such as the rock shelter types identified by Fairén in Alicante (see table 4.1). Conversely, the findings of the present study may suggest some patterns to look for in Alicante and elsewhere.

Given the current understanding of the main styles of post-Palaeolithic rock art as largely contemporary products of a single cultural group, rather than competing ethnic groups or distinct time periods, the question of whether particular motifs or combinations of motifs are associated with each other or specific aspects of the landscape becomes relevant. Such patterns may indicate concepts which are present across style boundaries and which are potential indicators of important concepts underlying the creation of rock art sites. This study has aimed to investigate the re-use and continuing importance of the imagery and certain aspects of the landscape through a more detailed consideration of motif types, while also attempting to move beyond the increasingly simple main styles. Defining types in this manner allows for the observation of patterns in the combinations of attributes which are not captured by style alone.

Appendices

Appendix A

Motif database table

Class	Type	Buen Aire I (W)	Buen Aire II (E)	Cabras	Canto Blanco	Cantos de la Visera I	Cantos de la Visera II	Cejo Cortado I	Cejo Cortado II	Collado de las Hermanas	Conchas (Peña Rubia)	Cuchillos	Enredaderas I and II	Enredaderas IV	Gargantones	Grajos I	Grajos II	Grajos III	Humo (Peña Rubia)	Junco I	Junco II	Laberinto	Lomo del Herrero I	Lomo del Herrero II	Mediodia	Milano	Monje II	Monje III	Palomas (Peña Rubia)	Paso I (Almadenes)	Paso II (Almadenes)	Pedrera	Peliciego	Pico de la Tienda I	Pico de la Tienda II	Pozo I	Pozo II	Pozo III	Pozo IV	Pucheros	Rumies	Serreta	**Total**
	Amorphous	37	0	0	0	1	5	10	3	0	0	4	0	0	1	1	0	1	0	0	2	0	6	1	5	16	0	0	2	0	0	0	1	2	4	3	3	13	1	0	0	3	**125**
Anthropomorph	AnthPossProp	4																								2								1									**7**
	AnthPossStick	2		1			3	2		1		1				1									6							3	2	3	3			1				3	**32**
	Archer	2									3								2							1			5					1								3	**17**
	AsexProp	5														3																		5	1								**14**
	AsexStick						5	2					1	2		2									4					1				3								6	**26**
	FemOther	1																																									**1**
	FemSkirt	1						4								19		3									1							1									**29**
	MaleProp	4														7	1									1								6									**19**
	MaleStick	1						1								1									1																		**4**
	Round															1										1								1									**3**
	Salamander																									1												1				1	**3**
	Thick																		1							1			3					1									**6**
Zoomorph	Bird						1																																				**1**
	Boar															5																	1										**6**
	Bull	1				4	8				1																2							1									**17**
	BullPoss						3																																				**3**
	Caprid	2				2									1		4	1	1		1				1	1	1				1	4	2							1			**23**
	CapridPoss	1					2		1							2					3											1										2	**12**
	Cervid		3			2	3									1			1							1			1					1									**13**
	CervidPoss						1	1								1				1								1	1														**6**
	Equid	2																																								2	**4**
	EquidPoss	1					5											1															4									7	**18**
	Quadruped	7	1		1	13	6						1			3										2	1	2					1	1				5				4	**48**
	ZoomPoss	6	2			5	4					1				1			1		2		2			3							2			1		1				1	**32**
Bisected	Anchor		2																						5																		**7**
	Bisected																																									1	**1**
	PhiLike							3		1		3			1		5					1				4						3	1		1			5			1	9	**38**
	PolyLobed	2					1	1						1								1			3	1										1					1	4	**16**
	Subtotal	*79*	*8*	*1*	*1*	*27*	*47*	*24*	*4*	*2*	*4*	*9*	*2*	*3*	*3*	*48*	*10*	*6*	*6*	*1*	*8*	*2*	*8*	*1*	*25*	*35*	*5*	*3*	*12*	*1*	*1*	*11*	*14*	*27*	*9*	*5*	*3*	*26*	*1*	*1*	*2*	*46*	*531*

Class	Type	Buen Aire I (W)	Buen Aire II (E)	Cabras	Canto Blanco	Cantos de la Visera I	Cantos de la Visera II	Cejo Cortado I	Cejo Cortado II	Collado de las Hermanas	Conchas (Peña Rubia)	Cuchillos	Enredaderas I and II	Enredaderas IV	Gargantones	Grajos I	Grajos II	Grajos III	Humo (Peña Rubia)	Junco I	Junco II	Laberinto	Lomo del Herrero I	Lomo del Herrero II	Mediodia	Milano	Monje II	Monje III	Palomas (Peña Rubia)	Paso I (Almadenes)	Paso II (Almadenes)	Pedrera	Peliciego	Pico de la Tienda I	Pico de la Tienda II	Pozo I	Pozo II	Pozo III	Pozo IV	Pucheros	Rumies	Serreta	**Total**
Circular	DotsGroup		2																																			2					**4**
	Lines	1										1				1							1		1	2								2				2			1		**12**
	RayCircle												1																									1					**2**
Linear	Bars											2	1													1																	**4**
	Comb		2				1					1	1													1												1					**7**
	Crook																								2	1												5					**8**
	Grid						3	2								1																											**6**
	Lines											5																															**5**
	LinesCurved	1														1																											**2**
	LinesGroup	2																																1	2		2	1				2	**10**
	LinesIntersecting				1			1																	1				1									1				1	**6**
	Projectile	2																																4				1				1	**8**
	Ramiform		1				2					16	2															1											1			1	**24**
	RamiformEyed											3																															**3**
	RamiformHead											5																															**5**
	Straight	3	2						3			1																									1	1					**11**
	Triangular															1										1																	**2**
	WavyZigzag	2					2																		1																		**5**
	Total	**90**	**15**	**1**	**2**	**27**	**55**	**27**	**7**	**2**	**4**	**43**	**7**	**3**	**3**	**52**	**10**	**6**	**6**	**1**	**8**	**2**	**9**	**1**	**30**	**41**	**5**	**4**	**13**	**1**	**1**	**11**	**14**	**34**	**11**	**5**	**6**	**41**	**2**	**1**	**3**	**51**	**655**

Site Buen Aire II (E)

Panel	*Motif*	*Style*	*Specific Type*	*Motif Description*
1	1	Schematic	Cervid	cervid, rayed tines
1	2	Schematic	Comb	pectiniform (rake), 4 vertical lines, 2 leftmost joined by horizontal line at top
1	3	Schematic	ZoomPoss	short horizontal line and two small dot-like remnants. Combined with #2 appears to be possible zoomorph, facing r, damaged by spall in between the two elements
1	4	Schematic	ZoomPoss	remnant, possibly zoomorph. No measurements given.
1	5	Schematic	Straight	horizontal line, measurements approximate
1	6	Schematic	Straight	vertical line, no width given
1	7	Schematic	Quadruped	partial zoomorph, most of body, part of head, and hind legs visible
1	8	Schematic	Ramiform	“ramiform” (branch like) l side seems to have 2 vertical lines, r side 5 stacked horizontal lines
1	9	Schematic	Comb	“pectiniform” (rake), 14 vertical lines joined by 1 horizontal line on top. Does not appear to be an animal remnant.
1	10	Schematic	Cervid	cervid, rayed tines
1	11	Schematic	Cervid	black cervid, above r tine of #10, tilted up toward the l. rayed tines.
1	12	Schematic	DotsGroup	group of 5 dots in “house” pattern. Possible hoof prints? .7-1 cm diam
1	13	Schematic	Anchor	two vertical lines topped with upside-down arc. Mateo describes as tree-like. Possible anthro?
1	14	Schematic	DotsGroup	group of 6 dots, .5 media diam
1	15	Schematic	Anchor	vertical lines with arc, similar to #13, also described as tree-like by Mateo

Site Buen Aire I (W)

Panel	*Motif*	*Style*	*Specific Type*	*Motif Description*
1	1	Levantine	Lines	annular (ring-shaped)
1	2	Levantine	Quadruped	quad (most of head missing)
1	3	Levantine	Quadruped	quad (species undetermined) directly underneath #4
1	4	Levantine	Equid	long tail and general shape leads mateo to consider this an equid
1	5	Levantine	FemOther	Group of lines, possibly remnant of anth, female anthro per mateo
1	6	Levantine	FemSkirt	Remnant, possibly of woman with triangular headdress and skirt. Width and facing direction questionable.
1	7	Levantine	AnthPossProp	Remnant, possible anthro but impossible to classify
1	8	Levantine	AnthPossProp	Remnant, possible anthro above and immediately to r of #7
1	9	Levantine	AnthPossStick	measurements approximate, blob (remnant), poss anth, indeterminate shape
1	10	Levantine	Equid	equid, based on long tail. Appears to be on top of #11
1	11	Levantine	ZoomPoss	“infrapuestos a la figura #10” 2 pairs of rectilinear lines, one over rump and other under head of #10. possible remnants of zoomorph. Measurments are upper and lower sets of lines. 3.6,3.6;3.2,4.2
1	12	Levantine	Caprid	caprid, rear legs mising, body filled by technique of parallel lines of color leaving space between
1	13	Levantine	LinesCurved	measurements approximate. U shaped remnant.
1	14	Levantine	Linear	vertical line, possible remnant. Width approximate. 0.5 to 1
1	15	Levantine	Projectile	ovoid/rectangular form. Possibly a bow, due to similarity to other levantine sites.
1	16	Levantine	ZoomPoss	remnant, possibly zoomorph. No measurements given.
1	17	Amorphous	Amorphous	remnant, no measurements given
1	18	Amorphous	Amorphous	remnant, no measurements given
1	19	Amorphous	Amorphous	remnant, no measurements given
1	20	Amorphous	Amorphous	remnant, no measurements given
1	21	Levantine	Straight	vertical line, no width given
1	22	Levantine	AnthPossStick	Group of vertical and horizontal lines (remnant?)
1	23	Amorphous	Amorphous	remnant, no measurements given
1	24	Levantine	Quadruped	quad remnant (body, one foreleg, both rear legs, no head) anth, indeterminate species
1	25	Levantine	Archer	Cross, possible anthro/archer remnant

Panel	Motif	Style	Specific Type	Motif Description
1	26	Levantine	Straight	horizontal line, no measurements given
1	27	Amorphous	Amorphous	remnant, no measurements given
1	28	Amorphous	Amorphous	remnant, no measurements given
1	29	Amorphous	Amorphous	remnant, no measurements given
1	30	Levantine	Archer	Poss anthro with headdress ("series of strokes over the head appear to shape a kind of ornament")
1	31	Amorphous	Amorphous	remnant, no measurements given
1	32	Amorphous	Amorphous	remnant, no measurements given
1	33	Levantine	Quadruped	zoomorph remnant
1	34	Amorphous	Amorphous	remnant, no measurements given
1	35	Levantine	Straight	horizontal line, no height measurements given
1	36	Amorphous	Amorphous	remnant, no measurements given
1	37	Amorphous	Amorphous	remnant, no measurements given
1	38	Levantine	ZoomPoss	possible zoomorph, no measurements given
1	39	Amorphous	Amorphous	remnant, no measurements given
1	40	Amorphous	Amorphous	remnant, no measurements given
1	41	Levantine	ZoomPoss	possible zoomorph
1	42	Amorphous	Amorphous	remnant, no measurements given
1	43	Amorphous	Amorphous	remnant, no measurements given
1	44	Levantine	AnthPossProp	Possible anthro
1	45	Levantine	AnthPossProp	Possible human, remnant, no measurements
1	46	Amorphous	Amorphous	remnant, no measurements given
1	47	Levantine	Caprid	caprid
1	48	Amorphous	Amorphous	remnant, no measurements given
1	49	Amorphous	Amorphous	remnant, no measurements given
1	50	Amorphous	Amorphous	remnant, no measurements given
1	51	Levantine	AsexProp	Human, trapezoid head, arms down at sides
1	52	Levantine	AsexProp	Human, poorly preserved, head with inverted triangle and left arm only
1	53	Levantine	AsexProp	Partial human, arm, head, left leg
1	54	Levantine	AsexProp	Human, only preserved to waist
1	55	Levantine	MaleProp	Human, double painted and rounded, facing into a crack, possibly bent to fit rock surface
1	56	Levantine	AsexProp	Human, poss headdress. Object btwn this and #57 interp as arrow by mateo, poss figures shooting at each other

Panel	***Motif***	***Style***	***Specific Type***	***Motif Description***
1	57	Levantine	MaleProp	Human, parallel line adjacent interpreted as arrow, possibly shooting #56
1	58	Amorphous	Amorphous	remnant, no measurements given
1	59	Amorphous	Amorphous	remnant, no measurements given
1	60	Levantine	LinesGroup	group of lines
1	61	Amorphous	Amorphous	remnant, no measurements given
1	62	Amorphous	Amorphous	remnant, no measurements given
1	63	Levantine	MaleStick	Human (presumably stick figure? No details or picture in mateo)
1	64	Levantine	Projectile	line to #63, possible bow and arrow
1	65	Levantine	LinesGroup	lines
1	66	Levantine	Bull	bovid (head only) with horns in frontal perspective, rear half missing
1	67	Amorphous	Amorphous	remnant, no measurements given
1	68	Levantine	Quadruped	unknown zoomorph, faces l, no headgear to identify species, probable caprid or cervid
1	69	Levantine	ZoomPoss	remnant, possibly zoomorph. No measurements given. Body only.
1	70	Levantine	ZoomPoss	remnant, possibly zoomorph. No measurements given. No head. Described as 'large' by Mateo.
1	71	Amorphous	Amorphous	remnant, no measurements given
1	72	Amorphous	Amorphous	remnant, no measurements given
1	73	Amorphous	Amorphous	remnant, no measurements given
1	74	Amorphous	Amorphous	remnant, no measurements given
1	75	Levantine	CapridPoss	zoomorph, possible caprid. No head, based on body shape.
1	76	Levantine	EquidPoss	zoomorph, possible equid. No head, based on body shape.
1	77	Amorphous	Amorphous	remnant, no measurements given
1	78	Amorphous	Amorphous	remnant, no measurements given
1	79	Levantine	Quadruped	unidentifiable zoomorph. No head
1	80	Amorphous	Amorphous	remnant, no measurements given
1	81	Levantine	Quadruped	unidentifiable species zoomorph
1	82	Amorphous	Amorphous	remnant, no measurements given
1	83	Amorphous	Amorphous	remnant, no measurements given
1	84	Levantine	MaleProp	Archer. Largest figure on panel, most anatomical details, but not phallic. No head. Given position under a crack, the head may never have been painted (mateo05buenaire: 58)
1	85	Levantine	MaleProp	Possible human archer, not pictured

Panel	Motif	Style	Specific Type	Motif Description
2	86	Macro	WavyZigzag	very heavy lines
2	87	Schematic	PolyLobed	bilobed “B” shape
2	88	Amorphous	Amorphous	remnant, no measurements given
2	89	Schematic	WavyZigzag	long zig zag motif
2	90	Schematic	PolyLobed	Bilobed, adjacent to #89

Site Cabras

Panel	Motif	Style	Specific Type	Motif Description
1	2	Schematic	AnthPossStick	Schematic style anthropomorph, painted with thick red lines \citep[31-33]{montes98arte}

Site Cantos de la Visera I

Panel	Motif	Style	Specific Type	Motif Description
1	1	Levantine	Bull	Large bull, painted over the linear-geometric motifs on the left side. Has clearly been repainted, possibly changing species (deer to bull?).
1	2	Schematic	LinesIntersecting	cross
1	3	Schematic	Grid	panel occupies 5.8m wide alcove. Group of lines, grid-like but not all intersecting.
1	4	Schematic	AnthPossStick	vertical line with l side upward angled branches and curvilinear backward s line on r; possible anthro?
1	5	Amorphous	Amorphous	Amorphous
1	6	Amorphous	Linear	amorphous, somewhat linear horizontally
1	7	Schematic	PhiLike	Circle with 4 attached lines—one long (on a stick?), one each l and r side appear to be downward-pointing arms, possible v-shape on head. Anthro? Phi-like?
1	8	Schematic	PolyLobed	bilobed figure-2 stacked circles with vertical bisecting line
1	9	Schematic	CervidPoss	zoomorph, apparent branching antlers
1	10	Schematic	Grid	vertical grid-like figure
1	11	Amorphous	Linear	linear remnant
1	12	Schematic	PhiLike	Possible phi-like anthro

Panel	Motif	Style	Specific Type	Motif Description
1	13	Amorphous	Amorphous	Amorphous
1	14	Amorphous	Amorphous	Amorphous
1	15	Amorphous	Linear	amorphous, somewhat linear horizontally
1	16	Schematic	MaleStick	Stick figure anthro, possible phallic, arms down
1	17	Schematic	FemSkirt	Stick figure, possible anth, female (dress/robes), no head, arms down
1	18	Schematic	AsexStick	Stick figure anth, no head
1	19	Schematic	AsexStick	Stick fig anth round head
1	20	Amorphous	Linear	vertical linear remnants
1	21	Amorphous	Amorphous	Amorphous
1	22	Amorphous	Linear	group of vertical lines (remnants)
1	23	Schematic	PhiLike	Phi-like anthro
1	24	Schematic	FemSkirt	Mateo describes as amorphous, but on closer inspection sems like a possible skirt?
1	25	Schematic	FemSkirt	Stick fig, poss skirt
1	26	Schematic	AnthPossStick	Linear remnant, possible stick figure anth
1	27	Schematic	FemSkirt	Mateo describes as a linear remnant, righ-left diagonal line with cuved segment pointing down to r. possible stick figure anth or phi-like. On closer inspection it appears to possibly be a female with a long skirt.

Site Cantos de la Visera II

Panel	Motif	Style	Specific Type	Motif Description
1	1	Amorphous	Amorphous	Amorphous
1	2	Amorphous	Linear	vertical line remnant
1	3	Schematic	Straight	slanted linear remnant l-r up
1	4	Amorphous	Amorphous	Amorphous
1	5	Amorphous	Amorphous	Amorphous
1	6	Schematic	Straight	slanted l-r down line
1	7	Schematic	Straight	slanted l-r down line
1	8	Schematic	CapridPoss	mateo describes as caprid but to me appears to have branching antlers. Tail down, head up, long legs.
1	9	Schematic	PhiLike	Partial phi-like anthropomorph
1	10	Schematic	AnthPossStick	remains of anth, indeterminate figures

Panel	***Motif***	***Style***	***Specific Type***	***Motif Description***
1	11	Schematic	Bull	unidentified quad, poss humped back and large head, poss horns—bull? Site is inside cave system.
1	12	Schematic	Archer	Thick line body, arms out at shoulder and crossed with vertical line, presumed archer
1	13	Semi-naturalistic	Archer	Archer, poorly preserved top, two legs with possible trousers? Heavy thigh lines. Bow and arrow, aimed directly at quad—very clear
1	14	Semi-naturalistic	Archer	Archer, body/legs curved to r, l arm crossed by long vertial line—spear?
1	15	Schematic	Bars	2 bars forming a v shape
1	16	Schematic	Ramiform	ramiform, faded, with 6 bars on the left
1	17	Schematic	Ramiform	Ramiform, 6 arms, largest on panel
1	18	Amorphous	Amorphous	remnant
1	19	Schematic	Ramiform	remnant of ramiform
1	20	Amorphous	Linear	elongated remnant
1	21	Amorphous	Linear	elongated remnant
1	22	Schematic	Ramiform	5 remnants, second a possible bar
1	23	Schematic	Ramiform	group of remnants, possible ramiform or phi
1	24	Schematic	PhiLike	remnant, possible phi
1	25	Schematic	PhiLike	Phi-like anthro
1	26	Schematic	Straight	2 nearly vertical lines
1	27	Schematic	Ramiform	remnant of ramiform, 4 bars on l, 3 “fringes” on the left? * *starred items are similar to cantos de la visera numbers 28, 29, 34, especially the end of los cuchillos
1	28	Schematic	Comb	pi (that is two parallel vertical lines with a bar over the top)
1	29	Schematic	PhiLike	Phi-like anthro, revealed using jStretch
1	30	Schematic	Ramiform	ramiform, “fringe” on left again, possible eyes *
1	31	Schematic	Lines	Semi-circular remnant
1	32	Schematic	Lines	fine linear remnant
1	33	Schematic	Ramiform	group of lines, possible ramiform, four arms
1	34	Schematic	Ramiform	group of lines, possible ramiform, 2 arms on L , 5 on R
1	35	Schematic	Ramiform	ramiform
1	36	Schematic	ZoomPoss	possible zoomorph (caprid), left-facing
1	37	Schematic	Lines	linear remnant
1	38	Schematic	RamiformEyed	ramiform with eyes
1	39	Schematic	Lines	2 vertical linear remnants

Panel	Motif	Style	Specific Type	Motif Description
1	40	Schematic	RamiformHead	ramiform with headdress
1	41	Schematic	Lines	6 horizontal lines in groups of 3. group of horizontal lines (ramiform remnant?)
1	42	Schematic	Ramiform	remnants, ramiform?
1	43	Schematic	RamiformHead	large ramiform, with head, possible feathers **see la serreta
1	44	Schematic	RamiformHead	large ramiform, with thick lines at head, multiple other lines
1	45	Schematic	Ramiform	ramiform, only visible with Jstretch
1	46	Schematic	RamiformHead	probably headdress ramiform, with face?
1	47	Schematic	RamiformHead	ramiform with head
1	48	Schematic	Ramiform	ramiform
1	49	Schematic	Ramiform	remnant of ramiform
1	50	Schematic	Bars	vertical bar
1	52	Schematic	Ramiform	large ramiform, indistinct arms
1	53	Schematic	RamiformEyed	ramiform with eyes, left eye only
1	54	Schematic	RamiformEyed	ramiform, remnant, with eyes?
1	55	Schematic	Ramiform	ramiform remnant
1	56	Schematic	AnthPossStick	Appears to be an anthropomorph. Found during field visit, October 2010

Site Canto Blanco

Panel	Motif	Style	Specific Type	Motif Description
1	1	Schematic	Quadruped	zoomorph, repainted at least once. May also have an anthropomorph. Possibly an attempt to convert the latter to the former, per Hernandez. Measurements approximate. May have two heads? repainted on both ends?
1	2	Schematic	LinesIntersecting	short vertical line crossed with a very short horizontal line. Possibly a remnant of a stick figure anthropomorph?

Site Cejo Cortado I

Panel	Motif	Style	Specific Type	Motif Description
1	1	Schematic	Cervid	partial zoomorph, head of cervid (branching antlers)

Panel	*Motif*	*Style*	*Specific Type*	*Motif Description*
2	2	Schematic	Quadruped	rear half of anth, indeterminate species zoomorph *check description against photos
2	3	Levantine	Bull	front half left facing bull (half moon horns)
2	4	Schematic	Quadruped	possibly polychrome or repainted quad, anth, indeterminate species (head beyond ears missing)
2	5	Levantine	Bull	front part of r facing bull
2	6	Schematic	Caprid	r facing male caprid
2	7	Schematic	Caprid	r facing caprid
2	8	Amorphous	Linear	linear remnant
2	9	Levantine	Bull	body and hind legs of bull, no head
2	10	Levantine	Bull	head of r facing bull
2	11	Schematic	Cervid	cervid
3	12	Schematic	Quadruped	zoomorph (body and head only)
3	13	Schematic	Quadruped	zoomorph, indeterminate species
3	14	Schematic	ZoomPoss	unidentified—rake, linear, or partial zoomorph?
3	15	Schematic	ZoomPoss	2 lines, possibly partial zoomorph
3	16	Schematic	ZoomPoss	partial zoomorph, perhaps?
3	17	Schematic	ZoomPoss	partial zoomorph, perhaps?
3	18	Schematic	Quadruped	zoomorph, indeterminate species
4	19	Schematic	Quadruped	zoomorph, indeterminate species
4	20	Schematic	ZoomPoss	partial zoomorph, perhaps?
5	21	Schematic	Quadruped	zoomorph, indeterminate species
5	22	Schematic	Quadruped	zoomorph, indeterminate species
5	23	Schematic	Quadruped	zoomorph, indeterminate species
5	24	LinearGeometric	WavyZigzag	vertical wavy lines (4-5)
6	25	LinearGeometric	Grid	Diamond-shaped horizontal grid with top bordering line
6	26	Schematic	EquidPoss	zoomorph, long tail and possibly bleeding from nose/mouth
7	27	Schematic	Bull	zoomorph, indeterminate species

Site Cejo Cortado II

Panel	*Motif*	*Style*	*Specific Type*	*Motif Description*
1	1	Levantine	BullPoss	zoomorph, possible bull

Panel	Motif	Style	Specific Type	Motif Description
1	2	Schematic	AsexStick	Left most figure in group of 3 stick figure anthropomorphs, with inverted v legs and arm extended to the left. Alonso does not depict these but they are visible in the photos.
1	3	Schematic	AsexStick	Central figure in group of 3 stick figure anthropomorphs. Inverted v legs, appears to link hands with figures on either side. Alonso does not depict these but they are visible in the photos.
1	4	Schematic	AsexStick	Right most figure in group of 3 stick figure anthropomorphs. Only the left leg is visible but conforms to the inverted v shape. Alonso does not depict these but they are visible in the photos.
1	5	LinearGeometric	Grid	grid pattern, overlain by large bull
1	6	Schematic	AsexStick	Stick figure anthro, possibly with bow
1	7	Schematic	Quadruped	Appears to be an outline of a zoomorph body, directly behind the front legs of the large repainted bull. The form is indistinct, however.

Site Collado de las Hermanas

Panel	Motif	Style	Specific Type	Motif Description
1	1	Levantine	EquidPoss	Brown color, revealed with ImageJ processing. Partial zoomorph, no head, species indeterminate
1	2	Amorphous	Amorphous	Brown color, revealed with ImageJ processing. Roughly triangular area of faded paint; possibly a skirt of another anthropomorph.

Site Conchas (Peña Rubia)

Panel	Motif	Style	Specific Type	Motif Description
1	1	Schematic	Quadruped	indeterminate species zoomorph
1	2	Schematic	Quadruped	indeterminate species zoomorph, front half only
1	3	Schematic	Quadruped	partial zoomorph
1	4	Schematic	Quadruped	partial zoomorph

Site Cuchillos

Panel	*Motif*	*Style*	*Specific Type*	*Motif Description*
1	1	Schematic	Quadruped	indeterminate species zoomorph, possibly a cervid. Does not seem to be in Cabre's drawing but this area of the panel is very confusing.
1	2	Schematic	Cervid	cervid superimposed on 16 grid ?
1	3	Schematic	AsexStick	Stick figure, superimposed on #10 quad
1	4	Schematic	Cervid	cervid, possibly outline, under large bull
1	5	Schematic	Grid	grid under quad 13
1	6	Schematic	Quadruped	zoomorph, indeterminate species, possibly a cervid. To the right of the branching antler cervid num. 15
1	7	Schematic	Quadruped	zoomorph, not bull, to the right of the grid.
1	8	Schematic	ZoomPoss	Indistinct area, appears to be the rear half of quadruped in cabre's drawing but indistinct in alonso's. Indistinct in the photographs as well.
1	9	Schematic	Quadruped	partial zoomorph, no head
1	10	Schematic	CapridPoss	possible caprid
1	11	Schematic	AnthPossStick	Photo analysis suggests a possible stick figure anthro, appears to be holding staff or similar on the right side. Cabre records this as a few lines, Alonso as a more substantial motif.
1	12	Levantine	Bird	Crane-like bird, also similar to comb or pectiniform type figures. However has a bill and feet. See parallels at Tajo de las Figuras?
1	13	Schematic	Cervid	Appears to be a cervid, painted with fine lines. Superimposed with the crane figure but it is unclear which is underneath.
1	14	Levantine	Bull	Bull with lunate horns and tassel tail. Belly portion curves downward in a manner reminiscent of the motif at Peliciego identified as a possible bull.
1	15	Schematic	EquidPoss	zoomorph, long tail, not bull (canid or equid?)
1	16	Schematic	EquidPoss	zoomorph, long tail, not bull (canid or equid?)
1	17	Amorphous	Amorphous	Recorded by cabre as a possible stick figure anthro, but in the photos and alonso's tracing this is indistinct.
1	18	Schematic	AnthPossStick	Possible stick figure anthro. Alonso records this as less distinct than cabre's stick figure, but the photo analysis shows a stick figure with possible upraised arms and inverted v legs.
1	19	Schematic	EquidPoss	zoomorph, long tail, not bull (canid or equid?)
1	20	Levantine	Bull	Bull

Panel	Motif	Style	Specific Type	Motif Description
1	21	Schematic	ZoomPoss	Group of lines, intersecting on the right side. Possibly the remains of a stick figure quadruped
1	22	Amorphous	Amorphous	Amorphous remnants
1	23	Schematic	ZoomPoss	horizontal line, appears thicker at r end, possible zoomorph
1	24	Schematic	Comb	cross with rake on top—possible human with headdress?
1	25	Schematic	PolyLobed	Poly-lobed shape with rayed end (top). Possible human with headdress?
1	26	Schematic	CervidPoss	Stick figure quadruped with long horns, Alonso draws this as having multiple tines like a comb on its side. This detail is indistinct in the photos but it is clearly a zoomorph.
1	27	Schematic	Ramiform	Anthro? Double arms, round head, flat headdress, possibly phallic. This figure could also be described as an ocular idol, perhaps, as the double arms could be instead the lines under the eyes.
1	28	Schematic	ZoomPoss	3 intersecting lines, possible partial quad
1	29	Schematic	CapridPoss	Partial quadruped, possibly a caprid
1	30	Amorphous	Amorphous	Area of amorphous remnants
1	31	Schematic	WavyZigzag	3 nested zigzag lines, horizontal
1	32	Amorphous	Amorphous	Area of amorphous remnants
1	33	Schematic	Ramiform	Poly-lobed shape with flat top, possible legs—anthro? Very similar to the other motif, also seems to have the nested curved lines that characterize the eyed idols
1	34	Levantine	BullPoss	appears to be the body and legs of a bull based on the profile of the back; head is missing
1	35	Levantine	BullPoss	Amorphous area with small curved lines that appear to be the lunate horns of a bull
1	36	Levantine	Bull	bull, head down (grazing? Or possibly fighting with other bulls in the group?)
1	37	Schematic	EquidPoss	zoomorph, possible equid
1	38	Amorphous	Amorphous	Amorphous
1	39	Levantine	Bull	tail end of bull, based on profile of back. Head is also down.
1	40	Levantine	Bull	bull, head down (grazing?)
2	1	Levantine	Bull	bull, head up
2	2	Levantine	Quadruped	Zoomorph, apparently painted with fine lines, superimposed by large repainted bull

Panel	Motif	Style	Specific Type	Motif Description
2	3	Schematic	AnthPossStick	Group of lines as recorded by cabre, alonso seems to omit this altogether, but photo analysis suggests an anthropomorph, possibly phallic.

Site Enredaderas IV

Panel	Motif	Style	Specific Type	Motif Description
1	1	Schematic	Ramiform	Montes98arte describes as eyed idols
1	2	Schematic	Bars	described in montes98arte bars
1	3	Schematic	AsexStick	Montes98arte schematic humans

Site Enredaderas I and II

Panel	Motif	Style	Specific Type	Motif Description
1	1	Schematic	Lines	Fine horizontal line and other amorphous remnants
1	2	Amorphous	Amorphous	Amorphous
1	3	Schematic	RayCircle	montes98arte star-shaped circle
1	4	Schematic	Ramiform	montes98arte tree-like ramiform
1	5	Schematic	AsexStick	Montes98arte anth
1	6	Schematic	Quadruped	indeterminate zoomporph
1	7	Schematic	Comb	montes98arte small size pectiniform

Site Gargantones

Panel	Motif	Style	Specific Type	Motif Description
1	1	Schematic	AsexStick	Montes98arte filiforms
1	2	Schematic	PolyLobed	montes98arte polylobed figures.
1	3	Amorphous	Linear	linear remnant

Site Grajos I

Panel	*Motif*	*Style*	*Specific Type*	*Motif Description*
1	2	Schematic	PhiLike	Phi-like anthro
1	3	Levantine	Caprid	3 partial levantine style caprids. The rock-art consists of three remnants of Levantine style zoomorphs, one of which is a male caprid with large horns, and several Schematic fragments, including a phi-like anthropomorph and several lines \citep[48]{alonso05pleita}.
1	4	Schematic	AsexStick	Elongated stick figure anthro, possibly running, with line under l leg. b.
1	5	Levantine	Quadruped	partial zoomorph (legs)
1	6	Levantine	CapridPoss	quad, possible caprid
1	7	Levantine	AsexProp	kneeling or bent over, possibly with staff, c
1	8	Levantine	FemSkirt	Long skirt, arms above head, ears or points on head, a
1	9	Levantine	AnthPossStick	Linear remnant, perhaps a large anthro, seems repainted
1	10	Levantine	FemSkirt	Anth, female anthro, round arms, long skirt, part of skirt and body missing, feet oriented r, e
1	11	Levantine	FemSkirt	Anth, female anthro, defined breasts, long skirt, 3 fingered hands, arms akimbo, feet splayed c
1	12	Levantine	FemSkirt	Similar to 9, no breasts or hands, bent arms. Superimp on #14, c
1	13	Levantine	FemSkirt	Part of skirt missing, arms bent, looped head, 3 fingers, c
1	14	Levantine	Quadruped	missing part of head and front legs, defined hooves or feet, long tail, uncertain species. Appears to be emerging from crack.
1	15	Schematic	MaleStick	Stick figure anthro, phallic, possibly 2 fingers
1	16	Levantine	FemSkirt	Partial very large anthro, missing head, superimposed by #10, possible long skirt
1	17	Levantine	MaleProp	Naturalistic (defined muscles), phallic, head missing, feet point r
1	18	Levantine	MaleProp	Muscles, possible long tail on headress or hair, partly obsured by spall, feet point r. beltran describes as type e but ot clear on postcard.
1	19	Levantine	FemSkirt	Possible long tail headdress, skirt, c
1	20	Levantine	MaleProp	Muscular, r facing, head missing, b
1	21	Levantine	FemSkirt	Muscular or skirt? Seems to have thick legs. Head missing, b
1	22	Levantine	FemSkirt	Loop head, long skirt, arms up but no oval, partly missing? Repainted or superimp by light red stick anthro, c?
1	23	Levantine	FemSkirt	Loop head? Long skirt, partly missing in middle, may be repainted or superimposed by remnant, c

Panel	Motif	Style	Specific Type	Motif Description
1	24	Levantine	FemSkirt	kneeling, r facing, 3 fingers holding a stick? Possible short skirt, superimp with #23, c
1	25	Levantine	FemSkirt	Elongated anthro, l facing, arms thrown out, muscular legs/buttocks, short skirt (beltran says yes, I don't see it)? Repainted or in 2 lines, c
1	26	Levantine	MaleProp	Short anthro, trapezoidal head, poss phallic
1	27	Levantine	AsexProp	L facing, arms overhad but not oval, 3 fingers, thick legs, no phallus, bent at hips
1	28	Schematic	Round	Short, rounded body anthro w/stick arms/legs, vertical stripes in body, underneath #27
1	29	Schematic	Boar	possible boar? Sm quad, r facing, short tail/legs, vertical striped body
1	30	Schematic	AsexProp	Partial anthro, r facing, thick legs, round head
1	31	Levantine	AsexStick	Large anthro, or possibly 2, upper part is round head, 3 finger arms, b
1	32	Levantine	ZoomPoss	not clear in beltran drawing—poss quad?
1	33	Levantine	CapridPoss	r facing schematic/stick type caprid, seems to be leaping upward, light red
1	34	Levantine	Boar	r facing, short legs/tail, vertical stripe body—boar?
1	35	Levantine	FemSkirt	Somewhat elongated torso, head shaped like club (in cards ♣), long skirt, feet face r, bowed torso? d. slopes down to right
1	36	Levantine	MaleProp	Small anthro (relative to #33) trapezoid head? Poss kilt, defined knee, slopes down to r, d
1	37	Levantine	FemSkirt	Long thin torso, long skirt, feet turned inward, triangular head, c
1	38	Schematic	Boar	boar or cervid? Rectangular body, vert stripe interior, head on top of body, l facing
1	39	Schematic	Grid	Grid-like, possibly containing stick anthro, 3 lines each way, top vertical crossover, curvilinear top
1	40	Levantine	MaleProp	Anth immediately adjacent to #37, round head, possible kilt, arms out straight b
1	41	Levantine	MaleProp	R facing phallus, defined legs, round head, arms up b
1	42	Levantine	Quadruped	r facing, poss caprid or cervid, rect body, appears horiz stripes, partial head missing, no tail
1	44	Levantine	FemSkirt	Anth tilting to r, poss skirt, r arm seems to hold disk—poss basket? Head has poss feather on l side, d
1	45	Levantine	Boar	partial quad, irregular oval body, only 3 legs present, horizontal zigzag fill

Panel	Motif	Style	Specific Type	Motif Description
1	46	Levantine	Cervid	l facing cervid, tail up, branching antlers, poss speckled—check photo
1	47	Levantine	CervidPoss	poss remnant of l facing linear quad, cervid, superimp on #46
1	52	Levantine	FemSkirt	Anthro, skirt, feet face l, round head, arms missing but #45 may be repainted arms
1	53	Levantine	FemSkirt	Anthro, long skirt, no feet, poss feather in hair, stretching to r, 3 fingers, c. appears to be chasing animal #49 together with #48
1	54	Levantine	Triangular	inverted triangular remnant
2	48	Levantine	Lines	curvilinear element, open oval
2	49	Levantine	LinesCurved	dark red curvi remnant
2	50	Levantine	FemSkirt	Breasts, long skirt, round head, 4 fingers l hand, 3 fingers r hand, streching r, b
2	51	Levantine	Boar	short legs, long tail, ear portion of head missing, poss boar

Site Grajos II

Panel	Motif	Style	Specific Type	Motif Description
1	1	Amorphous	Amorphous	two remnants, unidentifiable shape
1	2	Levantine	FemSkirt	May be part of #29, long skirt, feet, may have long belt on l side or one arm (long) down
1	3	Schematic	PhiLike	Phi-like anthro, with feather/headdress (see montes98arte:38, beltran69:51, own photos). Indistinct but visible in photo analysis.
1	4	Schematic	PhiLike	Phi-like anthro
1	5	Schematic	PhiLike	Phi-like anthro, possibly with a skirt
1	5	Schematic	PhiLike	Phi-like anthro
1	6	Schematic	Caprid	stick figure quads, per montes98arte: 39 uncertain about motifs in photo —only 2 visible
1	7	Schematic	PhiLike	Phi-like anthro, with feather/headdress (see montes98arte:38, beltran69:51, own photos). Indistinct but visible in photo analysis.
1	8	Schematic	Caprid	stick figure quads, per montes98arte: 39 uncertain about motifs in photo —only 2 visible
2	9	Schematic	Caprid	stick figure quads, caprids per montes98arte: 39 can't relocate in photos or at site, desigated as caprid w/headgear

Site Grajos III

Panel	*Motif*	*Style*	*Specific Type*	*Motif Description*
1	1	Schematic	Caprid	stick figure quads, caprids per montes98arte: 39 can't relocate in photos or at site, desigated as caprid w/headgear
1	2	Schematic	MaleProp	Elongated anthro, bent over to fit under step in rock face, appears to have headdress w/4 branches, possibly phallic, feet splayed, appears to have long arm hanging down or possible staff. In isolated location in side chamber toward back of shelter.
1	3	Levantine	Caprid	caprid, facing r, slightly raised tail—appers to be in head-butt posture
1	4	Levantine	FemSkirt	Brown color, long skirt, round head. Very tiny, inside rock shelter, facing inward. Isolated from other anthro figures, does not appear to be an element in between them.
1	5	Levantine	FemSkirt	Brown color, long skirt, round head. Very tiny, inside rock shelter, facing inward. #3 and #4 appear to be holding hands.
1	6	Levantine	FemSkirt	Brown color, long skirt, round head. Very tiny, inside rock shelter, facing inward. #3 and #4 appear to be holding hands.

Site Humo (Peña Rubia)

Panel	*Motif*	*Style*	*Specific Type*	*Motif Description*
1	1	Schematic	Caprid	single caprid identified on very weathered surface, see alonso & grimal in pleita #8. possibly a bull? Oriented slightly upward.
1	2	Levantine	ZoomPoss	outline/remnant, poss quad
1	3	Semi-naturalistic	Archer	Poss archer, legs to l, horiz line @ waist height, body largely missing
1	4	Levantine	Thick	Large “blobby” anthro, described as feminine by mateo poss breasts, large hips/thighs
1	5	Levantine	Cervid	cervid w/branching antlers, appears to have 3 arrows w/feathers in back
1	6	Semi-naturalistic	Archer	Archer, presumed male, firing arrow toward cervid #5

Site Junco I

Panel	Motif	Style	Specific Type	Motif Description
1	1	Schematic	CervidPoss	Left-facing zoomorph, possibly a caprid based on head shaper per alonso, not found in field, traced by alonso05pleita:52

Site Junco II

Panel	Motif	Style	Specific Type	Motif Description
1	1	Schematic	CapridPoss	Remnant of probable caprid
1	2	Schematic	CapridPoss	r facing quad, defined hooves (u shape?), uncertain head but probable caprid, tail down
1	3	Schematic	ZoomPoss	strictly speaking a linear remnant, but appears to be another r-facing quad
1	4	Schematic	CapridPoss	r facing quad, defined hooves (u shape?), with ears and either long horns or the legs of #3
1	5	Amorphous	Amorphous	group of remnants
1	6	Amorphous	Amorphous	group of remnants
1	7	Schematic	ZoomPoss	group of remnants, one part very similar to u-shaped hooves, possible quad remnant
1	8	Schematic	Caprid	r facing caprid, u shaped hooves, front part only. Appears partly superimp on or connected to another figure, possibly another quad

Site Laberinto

Panel	Motif	Style	Specific Type	Motif Description
1	1	Schematic	PolyLobed	Poly-lobed figure, at least 4 loops. Illustrated in salmeron00almadenes
1	2	Schematic	PhiLike	Phi-like figure with possible headdress, similar to motifs 38 and 44 at Cantos de la Visera II. Possible eyes.

Site Lomo del Herrero I

Panel	Motif	Style	Specific Type	Motif Description
1	1	Schematic	Linear	Remnant, vertical line

Panel	Motif	Style	Specific Type	Motif Description
1	2	Schematic	ZoomPoss	R facing quad, probably a deer (seems to have branching antlers). Mateo's drawing seems to show a small group of lines to the right that may be a second animal but he does not recognize it as such.
1	3	Schematic	Lines	Curvilinear remnant
1	4	Amorphous	Amorphous	Amorphous remains
1	5	Amorphous	Amorphous	Amorphous remains
1	6	Amorphous	Amorphous	Amorphous remains
2	1	Schematic	ZoomPoss	Possibly a zoomorph; seems to be the legs and head but the central part is missing. Examine this again if you can.
2	2	Amorphous	Amorphous	Amorphous
2	3	Schematic	Linear	Remnant, vertical line

Site Lomo del Herrero II

Panel	Motif	Style	Specific Type	Motif Description
1	1	Amorphous	Linear	Remnant, vaguely curvilinear, in left side of shelter, but no further identification

Site Mediodia

Panel	Motif	Style	Specific Type	Motif Description
1	1	Amorphous	Amorphous	Not sure which motif Mateo is describing, possibly Alonso's number 24? Amorphous remnant. Use Alonso's description
1	2	Schematic	ZoomPoss	Mateo's description is not illustrated, use Alonso's number and tracing. Partial quadruped.
1	3	Amorphous	Amorphous	Mateo and Alonso both describe this as amorphous remnants. Alonso's tracing has a possible hint of fingers on the right side.
1	4	Amorphous	Amorphous	Mateo and Alsonso both describe this as amorphous; Alonso's tracing shows the remains of several fine vertical lines but the shape is indistinct.
1	5	Amorphous	Amorphous	Mateo's description is not illustrated, but Alonso's drawing shows no hint of being a bilobed figure.

Panel	***Motif***	***Style***	***Specific Type***	***Motif Description***
1	6	Amorphous	Amorphous	Amorphous remnant; Alonso describes as a bar but to me this seems fortuitous.
1	7	Amorphous	Amorphous	Mateo describes this as a group of 3 dots (not depicted), with an average of 0.4cm diam. If Alonso is drawing the same area, this seems to be mere remnants of pigment. Not a group of dots comparable to ex. Buen Aire II.
1	8	Schematic	PhiLike	Phi like, v shaped head, possible legs (slanted line at bottom, pointing down to l). Alonso and Mateo agree. Possible legs, line through center extends and angles to l
1	9	Schematic	Triangular	Mateo describes this as a “halteriform”, or two roughly triangular areas of paint joined in the middle, somewhat like a barbell stood on end. Alonso describes as indeterminate but I agree with Mateo.
1	10	Schematic	PhiLike	Phi like, additional line to r on top and bottom, vertical remnant adjacent (on l side). Lines at bottom of bisected circle appear triangular, pointing to r. possible legs? Alonso and Mateo agree. Possible branching legs (line with shorter line angled down to r)
1	11	Schematic	Crook	vertical line, curved to r at top, very similar to el pozo. Alonso describes as a possible anthropomorph but I think this is a stretch.
1	12	Schematic	PhiLike	Mateo describes an amorphous area, Alonso's tracing includes an amorphous area with a possible phi-like shape. The image is very faint but appears to be a phi-like figure.
1	13	Schematic	PhiLike	Alonso's motif 24 is the squarish remnant, possibly a phi-like figure in my assessment.
1	14	Schematic	Bars	Series of four parallel black bars, possibly with a zoomorph painted on the top, per Alonso. Alonso's motif 24 is the group of black bars and the adjacent red blob. Alonso suggests that there may be part of a zoomorph painted over the black lines but I could not see this. I separated this into two motifs: the black bars and the red remnants.
1	15	Amorphous	Amorphous	Red remnants, part of Alonso's number 24
1	16	Schematic	PolyLobed	Polylobed, 8 ovals stacked, centers obscured by calcite, with fringed line apparently coming from top of motif and dangling to the r. Not sure which motif Mateo's 27 is describing, in Alonso's scheme this is the large poly-lobed motif

Panel	*Motif*	*Style*	*Specific Type*	*Motif Description*
1	17	Amorphous	Amorphous	Not sure which motif Mateo is describing, in Alonso's scheme this is an area of blackish remnants, in an unidentifiable shape. Judging from Alonso's drawing this may be a phi-like figure but it is too fragmentary to identify positively.
1	18	Amorphous	Amorphous	Not sure which motif Mateo is describing, in Alonso's this is an area of reddish-brown remnants of pigment, with no unidentifiable shape. I will follow Alonso and call this amorphous.
1	19	Amorphous	Amorphous	Not sure which motif Mateo is describing, in Alonso's scheme this is an area of multiple fine lines of various orientations, possibly once a complex motif. Alonso includes a section to the top left that seems to be comprised of nine vertical fine lines with a thicker bar over the top.
1	20	Schematic	Comb	Section in top left in Alonso's drawing, the section to the top left that seems to be comprised of nine vertical fine lines with a thicker bar over the top.
1	21	Schematic	Caprid	Caprid, based on Alonso's drawing
1	22	Levantine	Linear	Alonso's drawing includes an area which appears to be the remains of a human figure, or possibly two. They are not distinct enough to positively classify.
1	23	Levantine	AnthPossProp	Alonso describes this as an amorphous remnant, however, it appears to be an anthropomorph turned on its side, much like the possible motif number 3. The lower right half in particular appears to have defined muscular legs, typical of Levantine style figures.
1	24	Levantine	AnthPossProp	Alonso depicts an area of amorphous remnants with a possible anthropomorph, especially interesting because it appears to be the remnant of a hand with three fingers and a bracelet.
1	25	Levantine	Salamander	Alonso's 34, a group of amorphous remnants. To me the group of six parallel fine lines on the right is very suggestive of the “salamander” motif at El Pozo.
1	26	Amorphous	Amorphous	Another group of vaguely linear remnants, similar to the squarish motif number 24 but impossible to classify. Alonso's drawing number 35.
1	27	Amorphous	Amorphous	Alonso's 36, a group of faint remnants of pigment.

Panel	Motif	Style	Specific Type	Motif Description
1	28	Schematic	Lines	Alonso's 37, a group of elements all considered under one number, alonso identifies one as an anchor-like anthropomorph but in the drawing there is a line with possibly two more similar motifs adjacant to and connected to this. Below these are a curved horizontal line and some other remnants of horizontal lines, and further down a few more remnants including one that seems to be a t-shape.
1	29	Levantine	Lines	Alonso's 38, remains of a black circle with a bisecting line; possibly a phi-like figure but it appears to be more circular and painted with finer lines.
1	30	Amorphous	Amorphous	Alonso describes an area outside the cavity painted on the wall that houses the tombs, about 2m above the ground, remains of pigment can be seen (I missed this entirely in the field), but nothing identifiable

Site Milano

Panel	Motif	Style	Specific Type	Motif Description
1	1	Schematic	MaleStick	Stick figure, phallic or with three legs. Arms and legs appear curvilinear.
1	2	Amorphous	Linear	linear remnant
1	3	Schematic	AnthPossStick	Possible anthro, vertical line with apparent head, whisker-like curved lines 2 on each side of head, curved wavy line crosses about halfway down length of main line
1	4	Amorphous	Linear	rectilinear abstract
1	5	Schematic	Crook	curvilinear, r-facing “candy cane”
1	6	Schematic	Crook	curvilinear, r-facing “candy cane”
1	7	Amorphous	Amorphous	remnant
1	8	Schematic	PolyLobed	2 bisected curves (poly lobed?) similar to #1
1	9	Schematic	Lines	series of curvilinear lines, long/short alternating
1	10	Schematic	AsexStick	Poss stick figure anthro, poss running posture (to r)
1	11	Schematic	AnthPossStick	Possible stick figure anthro, no legs
2	12	Schematic	PolyLobed	poly-lobed/meander, irregular
2	13	Schematic	Anchor	vertical line topped with downward-facing arc; possibly an anthro?
2	14	Schematic	Anchor	similar to #13 but more oval
2	15	Schematic	Anchor	similar to #13 and #14, nearly a p-shape

Panel	***Motif***	***Style***	***Specific Type***	***Motif Description***
2	16	Schematic	Caprid	round body, apparent horns curving backward, raised tail, only two legs
2	17	Schematic	PolyLobed	Poly-lobed, vertical line with wave-like bottom, three arcing lines bisect, possible head; anthro?
2	18	Schematic	AsexStick	Stick figure, seems to be holding hands with #19
2	19	Schematic	AsexStick	Stick figure, seems to be holding hands with #18
2	20	Schematic	AsexStick	Stick figure anthro, standing on zigzag
2	21	Schematic	WavyZigzag	zigzag line (7 points), partly attached to 18, 19, 20
2	22	Schematic	LinesIntersecting	3 inverted v-shape lines—possible remnants of anthros
2	23	Amorphous	Amorphous	remnants
2	24	Amorphous	Linear	linear remnant
2	25	Schematic	Anchor	bisected arc with dot on top, possible anthro?
2	26	Schematic	AnthPossStick	Rectilinear remnants, possible anthro
2	27	Schematic	AnthPossStick	Rectilinear remnants, possible anthro
2	28	Schematic	AnthPossStick	Rectilinear remnants, possible anthro
2	29	Schematic	AnthPossStick	Rectilinear remnants, possible anthro, a bit more convincing possible r facing running, 2 arms
2	30	Schematic	Anchor	Bisected arc with dot at bottom, perhaps a stick figure human or possible bird
2	31	Levantine	MaleProp	Elongated anth w/triangular headdress, 3 fingers each hand, reaching r? L arm bent up at elbow, r out straight. May be holding object (bow?), although if so it is very different from other bows, and is identified as a separate motif (no. 2, id'd by mateo as possible female anthro).
2	32	Levantine	Round	Mateo descr as human, poss female, but looks like elongated oval w/flat line on top, additional five linear remnants. Alsonso descr. As possible human. I think that it is not clear that it is an anthro.
2	33	Amorphous	Linear	intersecting lines/remnant. Possible torso and legs of bent over or sideways human per Alonso.
2	34	Levantine	Quadruped	partial quad, most of head missing but extended line appears to be branching antler remnant. Indeterminate, however.
2	35	Levantine	ZoomPoss	mateo descr as group of lines but appears to be partial head of quad, poss cervid, oriented slanting up l to r. triangular shape at r end, remnants of paint at apparent ends of horns, and roughly linear sections at right angles parallel to triangle give this impression. Alonso agrees with my interp that this may represent a zoomorph.

Panel	Motif	Style	Specific Type	Motif Description
2	36	Levantine	ZoomPoss	remnant, group of lines per mateo. Appears to be a partial zoomorph if the group of lines is taken together. Alonso agrees with my interpretation. Species and sex indeterminate.
2	37	Levantine	Archer	Defined muscles, phallus, w/fingers holding bow/arrow, triangular headdress, arms down & out
2	38	Levantine	Thick	Mateo and Alonso both descr as poss female, not sure on what basis (ie no skirt or breasts). Thick lines, possibly indicating wide hips, body composed of multiple vertical lines, poss horned or oval headdress. Arms out at shoulder, 3 fingers. Possibly superimposed by cervid num. 9
2	39	Levantine	Cervid	branching antlers, poss ears?, head down, facing r, tail up.branching antlers, 4-5 tines, 2 prominent horn-like projections at front. Possibly changed from one species to another? No apparent difference in color, though. This one is also notable as part of the left antler is painted on a small projection from the rock surface.
2	40	Levantine	Quadruped	large zoomorph, probably a female cervid, ears, tail up. Largest animal on the panel.
2	41	Amorphous	Amorphous	amorph remnant, somewhat curvilinear

Site Monje II

Panel	Motif	Style	Specific Type	Motif Description
1	1	Levantine	FemSkirt	Partial anthro, no head, with staff in r hand, l hand has 3 digits, possible skirt or other clothing
1	2	Levantine	Bull	two lunate horns, tail, feet partially missing, facing l
1	3	Levantine	Bull	one lunate horn (back) visible, tail, back feet, body. All l facing
1	4	Levantine	Caprid	Caprid, based on Alonso's drawing of the curving horns. Barely visible in photographs and in field but I agree.
2	1	Levantine	Quadruped	quad, no head

Site Monje III

Panel	Motif	Style	Specific Type	Motif Description
1	1	Levantine	CervidPoss	zoomorph, apparent cervid, repainted on both ends
1	2	Levantine	Quadruped	zoomorph, poorly preserved
1	3	Levantine	Ramiform	Anthropomorph or “idol form”
2	4	Levantine	Quadruped	zoomorph, poorly preserved

Site Palomas (Peña Rubia)

Panel	Motif	Style	Specific Type	Motif Description
1	1	Schematic	Caprid	slick fig quad, long horns or ears, tail up. Caprid? Cervid?
1	2	Schematic	AnthPossStick	Inverted v, interp as lower portion of anthro by martinez03noticias:51. Possible anthropomorph, bowed legs and lower half of body
1	3	Schematic	EquidPoss	equid? Long tail, short ears. Possibly a male equid (martinez03noticias:51), see also alonso05pleita, as it seems to have testicles.
1	4	Schematic	AnthPossStick	Arching line over back of quad #4, interp as poss anthro legs, may be superimposed by quadruped, in which case the possible testicles may actually be part of the underlying figure
1	5	Amorphous	Amorphous	Amorphous
1	6	Schematic	ZoomPoss	poss quad remnants (body and leg)
1	7	Schematic	Caprid	rear legs absent, long straight ears or horns
1	8	Schematic	EquidPoss	hindquarters of quad, poss equid due to long tail
1	9	Schematic	EquidPoss	poorly preserved, poss equid due to long tail, poss spear in back. However the round hindquarters and tail from the top suggests maybe this is a bull?
1	10	Schematic	EquidPoss	irregular quad with large belly, poss equid. Interp by f. aviles as bison. The drooping belly is similar to the bull figure number 25, Cantos de la Visera II
1	11	Schematic	Quadruped	quad, no headgear, poss long tail or spear coming from under the tail area? Line intersects at back leg but wrong position for tail.
1	12	Schematic	Boar	long tail, rounded and bulky body, possible equid, interpreted as boar by f aviles
1	13	Schematic	ZoomPoss	poss remnant of quad, impossible to verify

Site Pedrera

Panel	*Motif*	*Style*	*Specific Type*	*Motif Description*
1	1	Schematic	Caprid	horns curving backward, stick figure caprid
1	2	Schematic	Caprid	horns curving backward, stick figure caprid
1	3	Schematic	Caprid	horns curving backward, stick figure caprid
1	4	Schematic	AnthPossStick	Possible stick figure anthro or cross
1	5	Schematic	PhiLike	Phi-like anthro, possibly wearing a skirt per \citep[101]{hernandez98cuatro, but enhancing the photograph shows that the lower half is more like legs.
1	6	Schematic	PhiLike	Phi-like anthro, poss phallic per \citep[101]{hernandez98cuatro}. Enhanced photograph confirms that there are three legs or lines at the bottom of the figure.
1	7	Schematic	PhiLike	Phi-like anthro, possibly wearing a skirt per \citep[101]{hernandez98cuatro, but enhancing the photograph shows that the lower half is more like legs.
1	8	Schematic	AnthPossStick	Remnant, possible anthro
1	9	Schematic	CapridPoss	remnant, possible caprid
1	10	Schematic	AnthPossStick	3 remnants, possibly anthros, obscured by dust on surface
1	11	Schematic	PhiLike	partial phi, no lower bisecting line

Site Peliciego

Panel	*Motif*	*Style*	*Specific Type*	*Motif Description*
1	1	Semi-naturalistic	Thick	Anthro, tall head, hands on hips, defined/large hips
1	2	Semi-naturalistic	Thick	Anthro? Tall head, arms @ hips, lower portion semi-circular/amorphous, anth, female per mateo
1	3	Amorphous	Amorphous	Amorphous
1	4	Semi-naturalistic	Archer	Anthro, both legs bent to r, firing arrow, yet appears seated or falling?
1	5	Semi-naturalistic	LinesIntersecting	group of lines, appears to be plant or tree of some sort per Mateo; possibly the antlers of an animal but not really classifiable
1	6	Semi-naturalistic	Archer	Anthro, legs and arm to r, possibly an archer but no bow remains, posture and orientation is similar to archer no. 9 directly in front of no. 8
1	7	Semi-naturalistic	Archer	Anthro, archer, firing toward #10 anthro

Panel	Motif	Style	Specific Type	Motif Description
1	8	Semi-naturalistic	Thick	Anthro, tall head, poss cape or similar, bowed legs/defined hips, extra r arm? *could it be a spear?
1	9	Semi-naturalistic	Cervid	cervid, branching antlers, oriented slanting up to l, tail raised
1	10	Semi-naturalistic	Archer	Archer, firing r toward #13 quad, legs bent to r
1	11	Semi-naturalistic	CervidPoss	quad partial. Poss caprid or cervid.
1	12	Schematic	AsexStick	remains of 5 figures, manifested as 2 arcing lines, 1 dot, and 2 diagonal lines
1	13	Schematic	Caprid	14 remains, including 1 schematic anthro (presumably a stick figure type)
1	14	Schematic	Caprid	horns curving backward, stick figure caprid

Site Pico de la Tienda I

Panel	Motif	Style	Specific Type	Motif Description
1	0	Semi-naturalistic	Quadruped	quad, unk species, elongated body
1	1	Semi-naturalistic	EquidPoss	quad, long tail, poss equid
1	2	Semi-naturalistic	EquidPoss	quad, long tail, poss equid, poss bleeding from nose? Seems to have testicles per salmeron; this in addition to large relative size and position at top of “pyramid” of quads gives impression is the stud of the group
1	3	Semi-naturalistic	EquidPoss	quad, long tail, short legs, poss canid? Salmeron interp as young equid or colt
1	4	Semi-naturalistic	EquidPoss	quad, partial head and ends of legs, presumed equid, possibly running
1	5	Semi-naturalistic	EquidPoss	partial quad, poss feline? Long tail, interp as equid by salmeron, running up to r
1	6	Semi-naturalistic	EquidPoss	partial quad, unk species long tail, poss equid, running up to r
1	7	Semi-naturalistic	Archer	Archer, 5 fingers, bow pointing at #13 quad, biconvex bow, poss headdress, defined toes, appears to be wearing bracelets on each arm
1	8	Schematic	PhiLike	Phi
1	9	Schematic	PhiLike	Phi
1	10	Semi-naturalistic	EquidPoss	probable partial quad, long tail, prob equid, running to r, superimp on #18

Panel	***Motif***	***Style***	***Specific Type***	***Motif Description***
1	11	Schematic	Ramiform	2 horiz lines bisected by vert line; poss anthro. Interp by salmeron as cruciform anthro; photo enhancement suggests there may also be a zoomorph here (on the bottom) and perhaps another motif to the left.
1	12	Semi-naturalistic	Quadruped	quad, round body, short tail, partial head
1	13	Semi-naturalistic	Quadruped	quad, long tail, ears, body is outline filled in with horizontal strokes or lines
1	14	Semi-naturalistic	Equid	quad long tail tail up, equid, ears of #22 superimp on figure
1	15	Schematic	Equid	long tail down, presumed equid, body reminiscent of 'pectiniformes' per salmeron. Ascends up l-r
1	16	Semi-naturalistic	Projectile	lines slanting up l-r, appears branched at lower (l) end, poss feathered arrow?
1	17	Schematic	PhiLike	Phi, inverted, top taller than bottom
1	18	Semi-naturalistic	AnthPossStick	Apparent anthro or curvilinear line, if anthro appears seated
1	19	Schematic	LinesIntersecting	branching lines, anthro? Yes per salmeron
1	20	Semi-naturalistic	LinesGroup	group of lines, possible anthro (not per salmeron, he says not interpretable)
1	21	Semi-naturalistic	CapridPoss	stick fig quad, poss caprid or equid, long tail and ears/horns. Body reminiscent of pectiniformes.
2	22	Schematic	CapridPoss	stick fig quad, poss caprid, short tail and ears/horns. Body reminiscent of pectiniformes.
2	23	Semi-naturalistic	Salamander	Stick anthro, defined fingers and toes, poss headdress. Described as salamander per mateo93serreta (and also I think Salmeron?). Not sure what salamander really means except perhaps claw-like fingers; this motif is not phallic.
2	24	Semi-naturalistic	LinesGroup	group of lines
2	25	Semi-naturalistic	PhiLike	Curvi motif, appears to be phi on side
2	26	Semi-naturalistic	ZoomPoss	group of lines, remnant of stick quad? Not per salmeron
2	27	Semi-naturalistic	Quadruped	quad, long tail, short ears
2	28	Semi-naturalistic	AnthPossStick	Group of lines, prob anthro, not per salmeron
2	29	Semi-naturalistic	AnthPossStick	Group of lines
2	30	Semi-naturalistic	PhiLike	Phi. Dots in interior on either side of vertical line suggests eyed idol per salmeron

Panel	*Motif*	*Style*	*Specific Type*	*Motif Description*
2	31	Semi-naturalistic	AsexStick	Stick figure w/headdress, 3 fingers each hand. Ancoriform? San nicolas del toro has suggested that the headdress may represent bovid horns turned downward
3	32	Semi-naturalistic	PolyLobed	Poly-lobed, 4 or 5 stacked circles, bisected, partially obsucred by accretion. Very similar to #2, seem to frame scene? Polylobed considered to be human figures per salmeron
3	33	Amorphous	Amorphous	Amorphous

Site Pico de la Tienda II

Panel	*Motif*	*Style*	*Specific Type*	*Motif Description*
1	1	Amorphous	Amorphous	Amorphous per salmeron06serreta:180, but described as a salamander in mateo93serreta:30. Neither is illustrated.
1	2	Amorphous	Amorphous	Amorphous area of paint, adjacent to the left side of archer num. 14. Revealed using Dstretch to analyse the photographs.
1	3	Semi-naturalistic	AsexStick	Revealed using Dstretch to analyze the photographs. Appears to be a stick-figure anthropomorph, possibly with defined fingers.
1	4	Schematic	Bisected	Revealed using Dstretch to analyze the photographs. Inverted tear drop shape, with central bisecting line and filled with several additional diagonal lines. Reminiscent of Levantine style tree motifs elsewhere but is unique in the study area.
1	5	Semi-naturalistic	PhiLike	Elaborated phi anthro, topped with curved line interp as headdress (perhaps downward horns?), rayed lines over rest of body, appears to have 2 legs, may emerge from step in rock face. Height is guess
1	6	Schematic	AsexStick	Stick fig anthro, ancoriforme head (eg. Upside-down anchor shape). Height is guess
1	7	Schematic	PolyLobed	poly lobed, 5 stacked rings with bisecting line.
1	8	Schematic	PolyLobed	poly lobed, 2 stacked rings with bisecting line, poorly preserved
1	9	Schematic	AsexStick	Stick figure anth with defined fingers and toes
1	10	Schematic	AsexStick	Stick figure anth with defined fingers and toes
1	11	Schematic	AsexStick	Cruciform anthro, arms up, defined fingers

Site Pozo I

Panel	*Motif*	*Style*	*Specific Type*	*Motif Description*
1	1	Levantine	Archer	possible male, 2 arms to right holding possible bow & arrow (upright)
1	2	Levantine	MaleProp	Similar to #0—poss male anthro, foot turned out to r, head poorly preserved
1	3	Levantine	MaleProp	Similar to above, central torso and l arm affected by spalls
1	4	Levantine	AnthPossStick	Circular head with long hair?, elongated body and arms form cross
1	5	Levantine	FemSkirt	Round head, skirt apparently painted on after body, similr to AII (?) at los grajos *

Site Pozo II

Panel	*Motif*	*Style*	*Specific Type*	*Motif Description*
1	1	Levantine	Thick	Round head, R arm perpendicular to body, open/splayed feet? Details mentioned in article seem dubious given preservation.
1	2	Levantine	AsexStick	Round head, cross arms, also dubious details
1	3	Levantine	AnthPossStick	Group of lines, possible anthro
1	4	Levantine	MaleProp	Therianthropic figure? w/phallus, arms up, hands out—antlers?
1	5	Levantine	MaleProp	Therianthropic figure, very long arms, arms up, fingers out. Id'd by salmeron as masculine but not sure why
1	6	Levantine	AnthPossStick	Lower part of figure, plus arms to l?

Site Pozo III

Panel	*Motif*	*Style*	*Specific Type*	*Motif Description*
1	1	Levantine	AsexProp	Possible therianthrope or headdress like #8, central part missing
1	2	Levantine	AnthPossProp	Lower part and l leg of anthro, possibly id'd by salmeron as male because has no skirt?
1	3	Levantine	AsexProp	Round head or headdress, arms up to l
1	4	Levantine	AsexProp	Curved body to l, possible headdress
1	5	Levantine	AsexProp	upper arms and feet of dancing figure, possibly w/headdress

Panel	*Motif*	*Style*	*Specific Type*	*Motif Description*
1	6	Levantine	Quadruped	Zoomorph, described as left facing and tilting down. Not pictured in salmeron. ID in photo?
1	7	Schematic	LinesGroup	group of lines, not pictured in salmeron
1	8	Schematic	Lines	round or curvilinear area
2	9	Amorphous	Amorphous	remnant
2	10	Levantine	MaleProp	Archer, pointing down l, with possible headdress and phallus. I think that this motif does not have a head at all.
2	11	Levantine	Projectile	interp as spear, moving up to the l (20cm away) of #25
2	12	Levantine	Projectile	partly damaged by spalls, parallel to #23, close to #24, moving up to l (spear)
2	13	Levantine	Projectile	spear, close to #22 (1.5) and parallel
2	14	Levantine	Projectile	arrow
2	15	Levantine	Bull	large bull, head partly covered by calcite
2	16	Levantine	Cervid	large male deer, hind legs and l body as well as head are only remains, faces r and up 3.2,4.2
2	17	Levantine	Round	Interp as anth, female, round body, poss headdress
2	18	Levantine	MaleProp	Below large bull, bow near head on l, large penis and buttocks, repainted
2	19	Levantine	AsexProp	Not pictured, anthro, poss also dancing?
2	20	Levantine	Lines	semicircular outline, open to l, w/separate lines to l side
3	21	Levantine	AsexStick	See # 32 2 large anthros w/round heads, disproportionately large, appear to be continuous or in contact. Description from salmeron97tienda
3	22	Levantine	AsexStick	See #31 (other part of 2 anthros) 2 large anthros w/round heads, disproportionately large, appear to be continuous or in contact. Description from salmeron97tienda
4	23	Amorphous	Amorphous	remnant
4	24	Schematic	AnthPossStick	amorphous, possible anthro, more than one fig but impossible to discern
4	25	Schematic	AnthPossStick	Long vertical line, heavy, slightly bent to l, maybe remnant of anthro
4	26	Schematic	PhiLike	Arc, crosses line #2 and appears to form phi-like
4	27	Schematic	AnthPossStick	Branching lines, resembles brush pointing downward, poss partial anthro? Phallic if so
4	28	Amorphous	Linear	vertical line, may be remants of fig #4 together with #6
4	29	Amorphous	Amorphous	Amorphous

Panel	Motif	Style	Specific Type	Motif Description
4	30	Amorphous	Linear	linear remnant
4	31	Schematic	AsexProp	Partial anthro, head is bisected oval with rays, appears to have arms up and defined fingers
4	32	Schematic	LinesGroup	series of parallel lines, possible extension to #8 fingers
4	33	Schematic	LinesGroup	2 long thin lines
4	34	Amorphous	Amorphous	Amorphous
4	35	Schematic	PolyLobed	possible poly lobed, appears to have central vertical line with two cross bars, possible branching top, amorphous areas connected on lower l and r sides. Whole panel described as ten areas of paint; unidentifiable, as described by mateo
5	36	Schematic	ZoomPoss	curvilinear area with 2 lines extending to l. if viewed sideways, appears to be partial quad, oriented down and to the r
6	37	Amorphous	Amorphous	Amorphous
6	38	Amorphous	Amorphous	Amorphous
7	39	Amorphous	Amorphous	Amorphous
7	40	Amorphous	Linear	remains of large figure, vaguely rectilinear (rectangular)
8	41	Schematic	LinesGroup	group of vertical lines (remnants)

Site Pozo IV

Panel	Motif	Style	Specific Type	Motif Description
1	1	Schematic	Straight	vertical line
1	2	Amorphous	Amorphous	Amorphous

Site Pucheros

Panel	Motif	Style	Specific Type	Motif Description
1	1	Schematic	LinesGroup	group of 6 lines in irregular arrangement

Site Rumies

Panel	*Motif*	*Style*	*Specific Type*	*Motif Description*
1	1	Amorphous	Amorphous	Amorphous
1	2	Schematic	LinesIntersecting	ancoriform (short vert line on l with upside-down u or staple shape to r), poss remnant of quad?
1	3	Schematic	Linear	linear remnant

Site Serreta

Panel	*Motif*	*Style*	*Specific Type*	*Motif Description*
1	1	Amorphous	Linear	linear remnant
1	2	Schematic	Linear	linear remnant
1	3	Schematic	Salamander	Salamander anthro, 3 long fingers each hand, arms up, long tail or phallus, extra arm r side?
1	4	Schematic	Straight	slanted line
1	5	Schematic	Crook	horiz line with slight curve, poss remnant of something else
1	6	Schematic	Quadruped	stick quad, 2 ears or straight horns
1	7	Schematic	PhiLike	Phi-like anthro
1	8	Schematic	PhiLike	Phi, right side of circle missing
1	9	Schematic	Crook	crook (slanted line l-down r, “hook” at upper l end)
1	10	Schematic	Quadruped	stick quad, head partly missing
1	11	Schematic	Crook	vertical line, slight curve
1	12	Schematic	Quadruped	stick quad, 2 ears
1	13	Schematic	PhiLike	vertical linear remnant, possibly a phi-like motif
1	14	Schematic	PhiLike	Partial phi-like, “esquema de brazos en asa”
1	15	Schematic	Crook	crook (slanted line l-down r, “hook” at upper l end)
1	16	Schematic	PhiLike	Phi-like anthro
1	17	Schematic	Linear	slanted linear remnant
1	18	Amorphous	Amorphous	Amorphous
1	19	Amorphous	Amorphous	Amorphous
1	20	Amorphous	Amorphous	Amorphous
1	21	Schematic	ZoomPoss	linear remnant, poss branching antler quad, if so faces l
1	22	Schematic	Linear	slanted linear remnant l-r up
1	23	Amorphous	Amorphous	Amorphous
1	24	Amorphous	Linear	amorphous, poss group of lines

Panel	Motif	Style	Specific Type	Motif Description
1	25	Schematic	AnthPossStick	vertical line with branch to r; poss stick fig anth
1	26	Schematic	Comb	Rake-like group of lines, poss quad, face l if so
1	27	Schematic	DotsGroup	.3-1.3 diameter irregular arrangement of dots
1	28	Schematic	DotsGroup	irregular arrangement of dots, 22, .4-1.5 diam
1	29	Schematic	Quadruped	stick figure quad, long tail and head, ears
1	30	Schematic	Crook	curving line, sideways candy-cane, crook at l side
1	31	Schematic	Quadruped	stick quad, long tail, ears, hit by line #34
1	32	Schematic	Projectile	slanting line, intersects at neck of #33 quad, poss spear or arrow
1	33	Amorphous	Amorphous	Amorphous
1	34	Macro	RayCircle	remains of large motif, impossible to identify but includes fringe of 8 rays on l side, similar line weight to macroschematic paintings at pla de petracos or arrangement of rays at la serreta
1	35	Amorphous	Amorphous	Amorphous
1	36	Macro	LinesGroup	group of curvilinear signs 1 cross and 3 serpentine lines
1	37	Amorphous	Amorphous	Amorphous
1	38	Macro	Lines	vertical oval
1	39	Macro	Lines	circular e shape with 2 dots under l side
1	40	Amorphous	Amorphous	Amorphous
1	41	Schematic	Ramiform	ramiform or series of branching horizontal lines, somewhat curved, 8 lines
1	42	Levantine	Caprid	male goat, long horns, r facing, split hooves, lines + infill (not solid painted body). Bichrome (dark red lines, lighter infill). Classed as Levantine but a bit different; possibly fits into gap between Palaeo images in area and Levantine per montes.
1	43	Schematic	PhiLike	Bisected circle, long tail
1	44	Schematic	PolyLobed	poly lobed, interpreted as anthro because of apparent legs
2	1	Schematic	Lines	several orange circles in two groups
2	2	Schematic	PhiLike	Bisected circle, long tail, double lines (see my photos versus salmeron and mateo)
2	3	Schematic	PolyLobed	Polylobed, 3 stacked circles, bisected, partly obscured by accretion
2	4	Schematic	PhiLike	Phi no tail may be connected to #4
2	5	Schematic	PhiLike	Phi, partial tail
2	6	Semi-naturalistic	Archer	Stick fig archer, “seminaturalistic” per salmeron

Panel	Motif	Style	Specific Type	Motif Description
2	7	Schematic	Archer	Stick fig archer, vertical line in r hand interp as bow, shorter line in l interp as arrow

Appendix B

Chi-square test results, total motifs

Chi square test of independence: Class and Landform

Variables: Class
Landform

H_0: Class is independent of Landform
H_1: Class is not independent of Landform

Notes: Landform is the general location, that is, whether the site is located in a canyon or on a peak. This is a very general categorization based on simple in-person observation and the location of the site on a topographic map. For this analysis the total number of sites classified as a Canyon setting is 17, a Peak is 16, and Valley is 8.

Observed *O = observed frequency*

Count - MotifNum Class

Landform	Amorphous	Anthro.	Bisected	Circular	Linear	Zoom.	**Total Motifs**
Canyon	25	61	33	8	26	50	**203**
Peak	86	80	18	9	67	64	**324**
Valley	14	20	11	1	13	69	**128**
Total Motifs	**125**	**161**	**62**	**18**	**106**	**183**	**655**

Expected *E = row total * column total / overall total*

Landform	Amorphous	Anthro.	Bisected	Circular	Linear	Zoom.
Canyon	38.74	49.9	19.22	5.58	32.85	56.72
Peak	61.83	79.64	30.67	8.9	52.43	90.52
Valley	24.43	31.46	12.12	3.52	20.71	35.76

Chi square $(O\text{-}E)^2/E$

Landform	Amorphous	Anthro.	Bisected	Circular	Linear	Zoom.	**Total X2**
Canyon	4.87	2.47	9.89	1.05	1.43	0.8	**20.51**
Peak	9.45	0	5.23	0	4.05	7.77	**26.5**
Valley	4.45	4.18	0.1	1.8	2.87	30.89	**44.3**
Total X2	**18.77**	**6.65**	**15.22**	**2.85**	**8.35**	**39.46**	**91.31**

df = (r-1)(c-1) = 10
P value = 18.31 If X2 < P, fail to reject null
X^2 = **91.31** **If X2 > P, reject null**

Motif percentages (total of all motifs)

Landform	Amorphous	Anthro.	Bisected	Circular	Linear	Zoom.	**Total Motifs**
Canyon	3.82	9.31	5.04	1.22	3.97	7.63	**30.99**
Peak	13.13	12.21	2.75	1.37	10.23	9.77	**49.47**
Valley	2.14	3.05	1.68	0.15	1.98	10.53	**19.54**
Total	**19.08**	**24.58**	**9.47**	**2.75**	**16.18**	**27.94**	**100**

Motif percentages (per class)

Landform	Amorphous	Anthro.	Bisected	Circular	Linear	Zoom.
Canyon	20	37.89	53.23	44.44	24.53	27.32
Peak	68.8	49.69	29.03	50	63.21	34.97
Valley	11.2	12.42	17.74	5.56	12.26	37.7
Total	**80**	**62.11**	**46.77**	**55.56**	**75.47**	**72.68**

Chi square test of independence: Class and Style

Variables:	Class Style
H_0:	Class is independent of Style
H_1:	Class is not independent of Style
Notes:	Semi-naturalistic, sub-naturalistic, and possible linear-geometric or macroschematic motifs are generally considered to be a subset of the schematic style, and are here included in the Schematic totals. Amorphous motifs are not included.

Observed	*O = observed frequency*					
Count - MotifNum	Class					
Style	Anthro.	Bisected	Circular	Linear	Zoom.	**Total Motifs**
Levantine	84		4	15	68	**171**
Schematic	77	62	14	91	115	**359**
Total Result	**161**	**62**	**18**	**106**	**183**	**530**

Expected	*E = row total * column total / overall total*				
Style	Anthro.	Bisected	Circular	Linear	Zoom.
Levantine	51.95	20	5.81	34.2	59.04
Schematic	109.05	42	12.19	71.8	123.96

Chi square	$(O\text{-}E)^2/E$					
Style	Anthro.	Bisected	Circular	Linear	Zoom.	**Total X2**
Levantine	19.78	20	0.56	10.78	1.36	**52.48**
Schematic	9.42	9.53	0.27	5.13	0.65	**25**
Total X2	**29.2**	**29.53**	**0.83**	**15.91**	**2.01**	**77.48**

df = (r-1)(c-1) =	4	
P value =	9.49	If X2 < P, accept null
X^2 =	**77.48**	If X2 > P, reject null

Motif percentages						
Style	Anthro.	Bisected	Circular	Linear	Zoom.	**Total Motifs**
Levantine	15.85	0	0.75	2.83	12.83	**32.26**
Schematic	14.53	11.7	2.64	17.17	21.7	**67.74**
Total Result	**30.38**	**11.7**	**3.4**	**20**	**34.53**	**100**

Motif percentages (per class)					
Style	Anthro.	Bisected	Circular	Linear	Zoom.
Levantine	52.17	0	22.22	14.15	37.16
Schematic	47.83	100	77.78	85.85	62.84

Chi square test of independence: Class and Viewshed

Variables:	Class Viewshed
H_0:	Class is independent of Viewshed
H_1:	**Class is not independent of Viewshed**

Notes:

Observed *O = observed frequency*

Count - MotifNum	Class						
Viewshed	Amorphous	Anthro.	Bisected	Circular	Linear	Zoom.	**Total Result**
Restricted	27	72	30	8	27	50	**214**
Wide Vista	98	89	32	10	79	133	**441**
Total Result	**125**	**161**	**62**	**18**	**106**	**183**	**655**

Expected *E = row total * column total / overall total*

Viewshed	Amorphous	Anthro.	Bisected	Circular	Linear	Zoom.
Restricted	40.84	52.6	20.26	5.88	34.63	59.79
Wide Vista	84.16	108.4	41.74	12.12	71.37	123.21

Chi square $(O-E)^2/E$

Viewshed	Amorphous	Anthro.	Bisected	Circular	Linear	Zoom.	**Total Result**
Restricted	4.69	7.15	4.69	0.76	1.68	1.6	**18.98**
Wide Vista	2.28	3.47	2.27	0.37	0.82	0.78	**9.21**
Total Result	**6.97**	**10.63**	**6.96**	**1.13**	**2.5**	**2.38**	**28.18**

df = (r-1)(c-1) =	5	
P value =	11.07	If X2 < P, accept null
X^2 =	**28.18**	**If X2 > P, reject null**

Motif percentages

Viewshed	Amorphous	Anthro.	Bisected	Circular	Linear	Zoom.	**Total Result**
Restricted	4.12	10.99	4.58	1.22	4.12	7.63	**32.67**
Wide Vista	14.96	13.59	4.89	1.53	12.06	20.31	**67.33**
Total Result	**19.08**	**24.58**	**9.47**	**2.75**	**16.18**	**27.94**	**100**

Motif percentages (per class)

Viewshed	Amorphous	Anthro.	Bisected	Circular	Linear	Zoom.
Restricted	21.6	44.72	48.39	44.44	25.47	27.32
Wide Vista	78.4	55.28	51.61	55.56	74.53	72.68

Chi square test of independence: Class and Visibility

Variables: Class
Visibility

H_0: Class is independent of Visibility
H_1: Class is not independent of Visibility

Notes:

Observed *O = observed frequency*

Count - MotifNum	Class						
Visibility	Amorphous	Anthro.	Bisected	Circular	Linear	Zoom.	**Total Result**
Hidden	55	111	44	13	73	81	**377**
Seen	70	50	18	5	33	102	**278**
Total Result	**125**	**161**	**62**	**18**	**106**	**183**	**655**

Expected *E = row total * column total / overall total*

Visibility	Amorphous	Anthro.	Bisected	Circular	Linear	Zoom.
Hidden	71.95	92.67	35.69	10.36	61.01	105.33
Seen	53.05	68.33	26.31	7.64	44.99	77.67

Chi square $(O\text{-}E)^2/E$

Visibility	Amorphous	Anthro.	Bisected	Circular	Linear	Zoom.	**Total Result**
Hidden	3.99	3.63	1.94	0.67	2.36	5.62	**12.58**
Seen	5.41	4.92	2.63	0.91	3.2	7.62	**17.07**
Total Result	**9.4**	**8.55**	**4.56**	**1.58**	**5.55**	**13.24**	**29.65**

df = (r-1)(c-1) =	5	
P value =	11.07	If X2 < P, accept null
X^2 =	**29.65**	**If X2 > P, reject null**

Motif percentages

Visibility	Amorphous	Anthro.	Bisected	Circular	Linear	Zoom.	**Total Result**
Hidden	8.4	16.95	6.72	1.98	11.15	12.37	**57.56**
Seen	10.69	7.63	2.75	0.76	5.04	15.57	**42.44**
Total Result	**19.08**	**24.58**	**9.47**	**2.75**	**16.18**	**27.94**	**100**

Motif percentages (per class)

Visibility	Amorphous	Anthro.	Bisected	Circular	Linear	Zoom.
Hidden	44	68.94	70.97	72.22	68.87	44.26
Seen	56	31.06	29.03	27.78	31.13	55.74

Chi square test of independence: Class and Access

Variables:	Class Access
H_0:	Class is independent of Access
H_1:	**Class is not independent of Access**

Notes:

Observed *O = observed frequency*

Count - MotifNum	Class						
Access	Amorphous	Anthro.	Bisected	Circular	Linear	Zoom.	**Total Result**
Difficult	52	77	33	8	61	53	**284**
Easy	73	84	29	10	45	130	**371**
Total Result	**125**	**161**	**62**	**18**	**106**	**183**	**655**

Expected *E = row total * column total / overall total*

Access	Amorphous	Anthro.	Bisected	Circular	Linear	Zoom.
Difficult	54.2	69.81	26.88	7.8	45.96	79.35
Easy	70.8	91.19	35.12	10.2	60.04	103.65

Chi square $(O\text{-}E)^2/E$

Access	Amorphous	Anthro.	Bisected	Circular	Linear	Zoom.	**Total Result**
Difficult	0.09	0.74	1.39	0	4.92	8.75	**7.15**
Easy	0.07	0.57	1.07	0	3.77	6.7	**5.47**
Total Result	**0.16**	**1.31**	**2.46**	**0.01**	**8.69**	**15.44**	**12.62**

df = (r-1)(c-1) =	5	
P value =	11.07	If X2 < P, accept null
X^2 =	**12.62**	**If X2 > P, reject null**

Motif percentages

Access	Amorphous	Anthro.	Bisected	Circular	Linear	Zoom.	**Total Result**
Difficult	7.94	11.76	5.04	1.22	9.31	8.09	**43.36**
Easy	11.15	12.82	4.43	1.53	6.87	19.85	**56.64**
Total Result	**19.08**	**24.58**	**9.47**	**2.75**	**16.18**	**27.94**	**100**

Motif percentages (per class)

Access	Amorphous	Anthro.	Bisected	Circular	Linear	Zoom.
Difficult	41.6	47.83	53.23	44.44	57.55	28.96
Easy	58.4	52.17	46.77	55.56	42.45	71.04

Chi square test of independence: Class and Elevation

Variables: Class
Elevation

H_0: Class is independent of Elevation
H_1: Class is not independent of Elevation

Notes:

Observed *O = observed frequency*

	Class						
Elevation	Amorphous	Anthro.	Bisected	Circular	Linear	Zoom.	**Total Result**
High	74	91	33	9	73	78	**358**
Low	51	70	29	9	33	105	**297**
Total Result	**125**	**161**	**62**	**18**	**106**	**183**	**655**

Expected *E = row total * column total / overall total*

Elevation	Amorphous	Anthro.	Bisected	Circular	Linear	Zoom.
High	68.32	88	33.89	9.84	57.94	100.02
Low	56.68	73	28.11	8.16	48.06	82.98

Chi square $(O\text{-}E)^2/E$

Elevation	Amorphous	Anthro.	Bisected	Circular	Linear	Zoom.	**Total Result**
High	0.47	0.1	0.02	0.07	3.92	4.85	**4.59**
Low	0.57	0.12	0.03	0.09	4.72	5.84	**5.53**
Total Result	**1.04**	**0.23**	**0.05**	**0.16**	**8.64**	**10.69**	**10.11**

df = (r-1)(c-1) =	5	
P value =	11.07	**If X2 < P, accept null**
X^2 =	**10.11**	If X2 > P, reject null

Motif percentages

Elevation	Amorphous	Anthro.	Bisected	Circular	Linear	Zoom.	**Total Result**
High	11.3	13.89	5.04	1.37	11.15	11.91	**54.66**
Low	7.79	10.69	4.43	1.37	5.04	16.03	**45.34**
Total Result	**19.08**	**24.58**	**9.47**	**2.75**	**16.18**	**27.94**	**100**

Motif percentages (per class)

Elevation	Amorphous	Anthro.	Bisected	Circular	Linear	Zoom.
High	59.2	56.52	53.23	50	68.87	42.62
Low	40.8	43.48	46.77	50	31.13	57.38

Chi square test of independence: Anthropomorph gender and Viewshed

Variables: Anthropomorph gender
Viewshed

H_0: Anthropomorph gender is independent of Viewshed
H_1: Anthropomorph gender is not independent of Viewshed

Notes:

Observed *O = observed frequency*

	Anthropomorph gender				
Viewshed	AnthPoss	Asexual	Female	Male	**Total Result**
Restricted	6	15	26	25	**72**
Wide Vista	33	25	12	19	**89**
Total Result	**39**	**40**	**38**	**44**	**161**

Expected *E = row total * column total / overall total*

Viewshed	AnthPoss	Asexual	Female	Male
Restricted	17.44	17.89	16.99	19.68
Wide Vista	21.56	22.11	21.01	24.32

Chi square $(O\text{-}E)^2/E$

Viewshed	AnthPoss	Asexual	Female	Male	**Total Result**
Restricted	7.51	0.47	4.77	1.44	**14.18**
Wide Vista	6.07	0.38	3.86	1.16	**11.48**
Total Result	**13.58**	**0.84**	**8.63**	**2.6**	**25.66**

df = (r-1)(c-1) =	3	
P value =	7.82	If X2 < P, accept null
X^2 =	**25.66**	**If X2 > P, reject null**

Motif percentages

Viewshed	AnthPoss	Asexual	Female	Male	Total Result
Restricted	3.73	9.32	16.15	15.53	44.72
Wide Vista	20.5	15.53	7.45	11.8	55.28
Total Result	**24.22**	**24.84**	**23.6**	**27.33**	**100**

Motif percentages (per class)

Viewshed	AnthPoss	Asexual	Female	Male
Restricted	15.38	37.5	68.42	56.82
Wide Vista	84.62	62.5	31.58	43.18

Chi square test of independence: Anthropomorph gender and Visibility

Variables: Anthropomorph gender
Visibility

H_0: Anthropomorph gender is independent of Visibility
H_1: Anthropomorph gender is not independent of Visibility

Notes:

Observed *O = observed frequency*

	Anthropomorph gender				
Visibility	AnthPoss	Asexual	Female	Male	**Total Result**
Hidden	21	24	31	35	**111**
Seen	18	16	7	9	**50**
Total Result	**39**	**40**	**38**	**44**	**161**

Expected *E = row total * column total / overall total*

Visibility	AnthPoss	Asexual	Female	Male
Hidden	26.89	27.58	26.2	30.34
Seen	12.11	12.42	11.8	13.66

Chi square $(O\text{-}E)^2/E$

Visibility	AnthPoss	Asexual	Female	Male	**Total Result**
Hidden	1.29	0.46	0.88	0.72	**3.35**
Seen	2.86	1.03	1.95	1.59	**7.44**
Total Result	**4.15**	**1.49**	**2.83**	**2.31**	**10.79**

df = (r-1)(c-1) =	3	
P value =	7.82	If X2 < P, accept null
X^2 =	**10.79**	**If X2 > P, reject null**

Motif percentages

Visibility	AnthPoss	Asexual	Female	Male	Total Result
Hidden	13.04	14.91	19.25	21.74	68.94
Seen	11.18	9.94	4.35	5.59	31.06
Total Result	**24.22**	**24.84**	**23.6**	**27.33**	**100**

Motif percentages (per class)

Visibility	AnthPoss	Asexual	Female	Male
Hidden	53.85	60	81.58	79.55
Seen	46.15	40	18.42	20.45

Chi square test of independence: Anthropomorph gender and Access

Variables: Anthropomorph gender
Access

H_0: Anthropomorph gender is independent of Access
H_1: Anthropomorph gender is not independent of Access

Notes:

Observed	*O = observed frequency*				
	Anthropomorph gender				
Access	AnthPoss	Asexual	Female	Male	**Total Result**
Difficult	18	21	12	26	**77**
Easy	21	19	26	18	**84**
Total Result	**39**	**40**	**38**	**44**	**161**

Expected	*E = row total * column total / overall total*			
Access	AnthPoss	Asexual	Female	Male
Difficult	18.65	19.13	18.17	21.04
Easy	20.35	20.87	19.83	22.96

Chi square	$(O\text{-}E)^2/E$				
Access	AnthPoss	Asexual	Female	Male	**Total Result**
Difficult	0.02	0.18	2.1	1.17	**3.47**
Easy	0.02	0.17	1.92	1.07	**3.18**
Total Result	**0.04**	**0.35**	**4.02**	**2.24**	**6.65**

df = (r-1)(c-1) =	3	
P value =	7.82	**If X2 < P, accept null**
X^2 =	**6.65**	If X2 > P, reject null

Motif percentages

Access	AnthPoss	Asexual	Female	Male	Total Result
Difficult	11.18	13.04	7.45	16.15	47.83
Easy	13.04	11.8	16.15	11.18	52.17
Total Result	**24.22**	**24.84**	**23.6**	**27.33**	**100**

Motif percentages (per class)

Access	AnthPoss	Asexual	Female	Male
Difficult	46.15	52.5	31.58	59.09
Easy	53.85	47.5	68.42	40.91

Chi square test of independence: Anthropomorph gender and Landform

Variables: Anthropomorph gender
Landform

H_0: Anthropomorph gender is independent of Landform
H_1: Anthropomorph gender is not independent of Landform

Notes:

Observed *O = observed frequency*

	Anthropomorph gender				
Landform	AnthPoss	Asex	Female	Male	**Total Result**
Canyon	9	18	22	12	**61**
Peak	22	17	13	28	**80**
Valley	10	9		1	**20**
Total Result	**41**	**44**	**35**	**41**	**161**

Expected *E = row total * column total / overall total*

Landform	AnthPoss	Asex	Female	Male
Canyon	15.53	16.67	13.26	15.53
Peak	20.37	21.86	17.39	20.37
Valley	5.09	5.47	4.35	5.09

Chi square $(O\text{-}E)^2/E$

Landform	AnthPoss	Asex	Female	Male	**Total Result**
Canyon	2.75	0.11	5.76	0.8	**9.42**
Peak	0.13	1.08	1.11	2.86	**5.18**
Valley	4.73	2.29	4.35	3.29	**14.65**
Total Result	**7.61**	**3.47**	**11.22**	**6.95**	**29.24**

df = (r-1)(c-1) = 6
P value = 12.59 If X2 < P, accept null
X^2 = **29.24** **If X2 > P, reject null**

Motif percentages

Landform	AnthPoss	Asex	Female	Male	**Total Result**
Canyon	5.59	11.18	13.66	7.45	**37.89**
Peak	13.66	10.56	8.07	17.39	**49.69**
Valley	6.21	5.59	0	0.62	**12.42**
Total Result	**25.47**	**27.33**	**21.74**	**25.47**	**100**

Motif percentages (per class)

Landform	AnthPoss	Asex	Female	Male
Canyon	21.95	40.91	62.86	29.27
Peak	53.66	38.64	37.14	68.29
Valley	24.39	20.45	0	2.44

Chi square test of independence: Anthropomorph gender and Elevation

Variables: Anthropomorph gender
Elevation

H_0: Anthropomorph gender is independent of Elevation
H_1: Anthropomorph gender is not independent of Elevation

Notes:

Observed *O = observed frequency*

	Anthropomorph gender				
Elevation	AnthPoss	Asexual	Female	Male	**Total Result**
High	22	26	13	30	**91**
Low	17	14	25	14	**70**
Total Result	**39**	**40**	**38**	**44**	**161**

Expected *E = row total * column total / overall total*

Elevation	AnthPoss	Asexual	Female	Male
High	22.04	22.61	21.48	24.87
Low	16.96	17.39	16.52	19.13

Chi square $(O-E)^2/E$

Elevation	AnthPoss	Asexual	Female	Male	**Total Result**
High	0	0.51	3.35	1.06	**4.91**
Low	0	0.66	4.35	1.38	**6.39**
Total Result	**0**	**1.17**	**7.7**	**2.43**	**11.3**

df = (r-1)(c-1) =	3	
P value =	7.82	If X2 < P, accept null
X^2 =	**11.3**	**If X2 > P, reject null**

Motif percentages

Elevation	AnthPoss	Asexual	Female	Male	**Total Result**
High	13.66	16.15	8.07	18.63	**56.52**
Low	10.56	8.7	15.53	8.7	**43.48**
Total Result	**24.22**	**24.84**	**23.6**	**27.33**	**100**

Motif percentages (per class)

Elevation	AnthPoss	Asexual	Female	Male
High	56.41	65	34.21	68.18
Low	43.59	35	65.79	31.82

Chi square test of independence: Style and Viewshed

Variables: Style
Viewshed

H_0: Style is independent of Viewshed
H_1: Style is not independent of Viewshed

Notes:

Observed	*O = observed frequency*				
Count - MotifNum	Style				
Viewshed	Amorphous	Levantine	Schematic	Semi-naturalistic	**Total Result**
Restricted	23	52	95	44	**214**
Wide Vista	94	121	226		**441**
Total Result	**117**	**173**	**321**	**44**	**655**

Expected	*E = row total * column total / overall total*			
Viewshed	Amorphous	Levantine	Schematic	Semi-naturalistic
Restricted	38.23	56.52	104.88	14.38
Wide Vista	78.77	116.48	216.12	29.62

Chi square	$(O\text{-}E)^2/E$				
Viewshed	Amorphous	Levantine	Schematic	Semi-naturalistic	**Total Result**
Restricted	6.06	0.36	0.93	61.05	**68.41**
Wide Vista	2.94	0.18	0.45	29.62	**33.19**
Total Result	**9.01**	**0.54**	**1.38**	**90.67**	**101.6**

df = (r-1)(c-1) =	3	
P value =	7.82	If X2 < P, accept null
X^2 =	**101.6**	**If X2 > P, reject null**

Motif percentages					
Viewshed	Amorphous	Levantine	Schematic	Semi-naturalistic	**Total Result**
Restricted	3.51	7.94	14.5	6.72	**32.67**
Wide Vista	14.35	18.47	34.5	0	**67.33**
Total Result	**17.86**	**26.41**	**49.01**	**6.72**	**100**

Chi square test of independence: Style and Visibility

Variables:	Style Visibility
H_0:	Style is independent of Visibility
H_1:	**Style is not independent of Visibility**

Notes:

Observed	*O = observed frequency*				
Count - MotifNum	Style				
Visibility	Amorphous	Levantine	Schematic	Semi-naturalistic	**Total Result**
Hidden	50	101	182	44	**377**
Seen	67	72	139	0	**278**
Total Result	**117**	**173**	**321**	**44**	**655**

Expected	*E = row total * column total / overall total*			
Visibility	Amorphous	Levantine	Schematic	Semi-naturalistic
Hidden	67.34	99.57	184.76	25.33
Seen	49.66	73.43	136.24	18.67

Chi square	*$(O-E)^2/E$*				
Visibility	Amorphous	Levantine	Schematic	Semi-naturalistic	Total Result
Hidden	4.47	0.02	0.04	13.77	**18.3**
Seen	6.06	0.03	0.06	18.67	**24.81**
Total Result	**10.52**	**0.05**	**0.1**	**32.45**	**43.11**

df = (r-1)(c-1) =	3	
P value =	7.82	If X2 < P, accept null
X^2 =	**43.11**	**If X2 > P, reject null**

Motif percentages					
Visibility	Amorphous	Levantine	Schematic	Semi-naturalistic	**Total Result**
Hidden	7.63	15.42	27.79	6.72	**57.56**
Seen	10.23	10.99	21.22	0	**42.44**
Total Result	**17.86**	**26.41**	**49.01**	**6.72**	**100**

Chi square test of independence: Style and Access

Variables:	Style Access
H_0:	Style is independent of Access
H_1:	**Style is not independent of Access**

Notes:

Observed *O = observed frequency*

Count - MotifNum	Style				
Access	Amorphous	Levantine	Schematic	Semi-naturalistic	**Total Result**
Difficult	49	52	139	44	**284**
Easy	68	121	182	0	**371**
Total Result	**117**	**173**	**321**	**44**	**655**

Expected *E = row total * column total / overall total*

Access	Amorphous	Levantine	Schematic	Semi-naturalistic
Difficult	50.73	75.01	139.18	19.08
Easy	66.27	97.99	181.82	24.92

Chi square $(O\text{-}E)^2/E$

Access	Amorphous	Levantine	Schematic	Semi-naturalistic	**Total Result**
Difficult	0.06	7.06	0	32.56	**39.67**
Easy	0.05	5.4	0	24.92	**30.37**
Total Result	**0.1**	**12.46**	**0**	**57.48**	**70.05**

df = (r-1)(c-1) =	3	
P value =	7.82	If X2 < P, accept null
X^2 =	**70.05**	**If X2 > P, reject null**

Motif percentages

Access	Amorphous	Levantine	Schematic	Semi-naturalistic	**Total Result**
Difficult	7.48	7.94	21.22	6.72	**43.36**
Easy	10.38	18.47	27.79	0	**56.64**
Total Result	**17.86**	**26.41**	**49.01**	**6.72**	**100**

Chi square test of independence: Style and Elevation

Variables:	Style Elevation
H_0:	Style is independent of Elevation
H_1:	**Style is not independent of Elevation**

Notes:

Observed *O = observed frequency*

Count - MotifNStyle

Elevation	Amorphous	Levantine	Schematic	Semi-naturalistic	**Total Result**
High	71	94	149	44	**358**
Low	46	79	172	0	**297**
Total Result	**117**	**173**	**321**	**44**	**655**

Expected *E = row total * column total / overall total*

Elevation	Amorphous	Levantine	Schematic	Semi-naturalistic
High	63.95	94.56	175.45	24.05
Low	53.05	78.44	145.55	19.95

Chi square $(O\text{-}E)^2/E$

Elevation	Amorphous	Levantine	Schematic	Semi-naturalistic	**Total Result**
High	0.78	0	3.99	16.55	**21.32**
Low	0.94	0	4.81	19.95	**25.7**
Total Result	**1.72**	**0.01**	**8.79**	**36.5**	**47.02**

df = (r-1)(c-1) :	3	
P value =	7.82	If X2 < P, accept null
X^2 =	**47.02**	**If X2 > P, reject null**

Motif percentages

Elevation	Amorphous	Levantine	Schematic	Semi-naturalistic	**Total Result**
High	10.84	14.35	22.75	6.72	**54.66**
Low	7.02	12.06	26.26	0	**45.34**
Total Result	**17.86**	**26.41**	**49.01**	**6.72**	**100**

Chi square test of independence: Style and Landform

Variables: Style
Landform

H_0: Style is independent of Landform
H_1: Style is not independent of Landform

Notes:

Observed *O = observed frequency*
Count - MotifNStyle

Landform	Amorphous	Levantine	Schematic	Semi-naturalistic	**Total Result**
Canyon	21	50	103	29	**203**
Peak	82	106	121	15	**324**
Valley	14	17	97	0	**128**
Total Result	**117**	**173**	**321**	**44**	**655**

Expected *E = row total * column total / overall total*

Landform	Amorphous	Levantine	Schematic	Semi-naturalistic
Canyon	36.26	53.62	99.49	13.64
Peak	57.87	85.58	158.78	21.76
Valley	22.86	33.81	62.73	8.6

Chi square $(O-E)^2/E$

Landform	Amorphous	Levantine	Schematic	Semi-naturalistic	**Total Result**
Canyon	6.42	0.24	0.12	17.31	**24.1**
Peak	10.06	4.87	8.99	2.1	**26.03**
Valley	3.44	8.36	18.72	8.6	**39.11**
Total Result	**16.48**	**5.12**	**9.12**	**19.41**	**50.13**

df = (r-1)(c-1) 3
P value = 7.82 If X2 < P, accept null
X^2 = **50.13** **If X2 > P, reject null**

Motif percentages

Landform	Amorphous	Levantine	Schematic	Semi-naturalistic	**Total Result**
Canyon	3.21	7.63	15.73	4.43	**30.99**
Peak	12.52	16.18	18.47	2.29	**49.47**
Valley	2.14	2.6	14.81	0	**19.54**
Total Result	**17.86**	**26.41**	**49.01**	**6.72**	**100**

X2SuperStyAcc

Chi square test of independence: Superstyle and Access

Variables:	Superstyle Access
H_0:	Superstyle is independent of Access
H_1:	**Superstyle is not independent of Access**
Notes:	The “superstyle” designation combines the Semi-naturalistic and Schematic style motifs into a single Schematic style category.

Observed	*O = observed frequency*			
Count - MotifNum	Superstyle			
Access	Amorphous	Levantine	Schematic	**Total Result**
Difficult	49	52	183	**284**
Easy	68	121	182	**371**
Total Result	**117**	**173**	**365**	**655**

Expected	*E = row total * column total / overall total*		
Access	Amorphous	Levantine	Schematic
Difficult	50.73	75.01	158.26
Easy	66.27	97.99	206.74

Chi square	*$(O-E)^2/E$*			
Access	Amorphous	Levantine	Schematic	**Total Result**
Difficult	0.06	7.06	3.87	**10.99**
Easy	0.05	5.4	2.96	**8.41**
Total Result	**0.1**	**12.46**	**6.83**	**19.39**

df = (r-1)(c-1) =	2	
P value =	5.99	If X2 < P, accept null
X^2 =	**6.83**	**If X2 > P, reject null**

Motif percentages			
Access	Amorphous	Levantine	Schematic
Difficult	7.48	7.94	27.94
Easy	10.38	18.47	27.79
Total Result	**17.86**	**26.41**	**55.73**

Chi square test of independence: Superstyle and Viewshed

Variables:	Superstyle Viewshed
H_0:	**Superstyle is independent of Viewshed**
H_1:	Superstyle is not independent of Viewshed
Notes:	The “superstyle” designation combines the Semi-naturalistic and Schematic style motifs into a single Schematic style category.

Observed *O = observed frequency*

Count - MotifNum	Superstyle			
Viewshed	Amorphous	Levantine	Schematic	**Total Result**
Restricted	23	52	139	**214**
Wide Vista	94	121	226	**441**
Total Result	**117**	**173**	**365**	**655**

Expected *E = row total * column total / overall total*

Viewshed	Amorphous	Levantine	Schematic
Restricted	38.23	56.52	119.25
Wide Vista	78.77	116.48	245.75

Chi square $(O\text{-}E)^2/E$

Viewshed	Amorphous	Levantine	Schematic	**Total Result**
Restricted	6.06	0.36	3.27	**9.7**
Wide Vista	2.94	0.18	1.59	**4.71**
Total Result	**9.01**	**0.54**	**4.86**	**14.4**

df = (r-1)(c-1) =	2	
P value =	5.99	**If X2 < P, accept null**
X^2 =	**4.86**	If X2 > P, reject null

Motif percentages

Viewshed	Amorphous	Levantine	Schematic
Restricted	3.51	7.94	21.22
Wide Vista	14.35	18.47	34.5
Total Result	**17.86**	**26.41**	**55.73**

Chi square test of independence: Superstyle and Visibility

Variables: Superstyle
Visibility

H_0: Superstyle is independent of Visibility

H_1: Superstyle is not independent of Visibility

Notes: The “superstyle” designation combines the Semi-naturalistic and Schematic style motifs into a single Schematic style category.

Observed	*O = observed frequency*			
Count - MotifNum	Superstyle			
Visibility	Amorphous	Levantine	Schematic	**Total Result**
Hidden	50	101	226	**377**
Seen	67	72	139	**278**
Total Result	**117**	**173**	**365**	**655**

Expected	*E = row total * column total / overall total*		
Visibility	Amorphous	Levantine	Schematic
Hidden	67.34	99.57	210.08
Seen	49.66	73.43	154.92

Chi square	$(O-E)^2/E$			
Visibility	Amorphous	Levantine	Schematic	**Total Result**
Hidden	4.47	0.02	1.21	**5.69**
Seen	6.06	0.03	1.64	**7.72**
Total Result	**10.52**	**0.05**	**2.84**	**13.41**

df = (r-1)(c-1) =	2	
P value =	5.99	**If X2 < P, accept null**
X^2 =	**2.84**	If X2 > P, reject null

Motif percentages				
Visibility	Amorphous	Levantine	Schematic	**Total Result**
Hidden	7.63	15.42	34.5	**57.56**
Seen	10.23	10.99	21.22	**42.44**
Total Result	**17.86**	**26.41**	**55.73**	**100**

Chi square test of independence: Superstyle and Class

Variables: Superstyle
Class

H_0: Superstyle is independent of Class
H_1: Superstyle is not independent of Class

Notes: The “superstyle” designation combines the Semi-naturalistic and Schematic style motifs into a single Schematic style category. This test does not include the amorphous motifs.

Observed *O = observed frequency*

Count - MotifNum	Superstyle		
Class	Levantine	Schematic	**Total Result**
Anthropomorph	84	77	**161**
Bisected	0	62	**62**
Circular	4	14	**18**
Linear	15	91	**106**
Zoomorph	68	115	**183**
Total Result	**171**	**359**	**530**

Expected *E = row total * column total / overall total*

Class	Levantine	Schematic	**Total Result**
Anthropomorph	51.95	109.05	**161**
Bisected	20	42	**62**
Circular	5.81	12.19	**18**
Linear	34.2	71.8	**106**
Zoomorph	59.04	123.96	**183**
Total Result	**171**	**359**	**530**

Chi square $(O-E)^2/E$

Class	*Levantine*	Schematic	**Total Result**
Anthropomorph	*19.78*	9.42	**29.2**
Bisected	*20*	9.53	**29.53**
Circular	0.56	0.27	**0.83**
Linear	10.78	5.13	**15.91**
Zoomorph	1.36	0.65	**2.01**
Total Result	**52.48**	**25**	**77.48**

df = (r-1)(c-1) =	4	
P value =	9.49	If X2 < P, accept null
X^2 =	**77.48**	**If X2 > P, reject null**

X2SuperStyClass

Motif percentages

Class	Levantine	Schematic	**Total Result**
Anthropomorph	15.85	14.53	**30.38**
Bisected	0	11.7	**11.7**
Circular	0.75	2.64	**3.4**
Linear	2.83	17.17	**20**
Zoomorph	12.83	21.7	**34.53**
Total Result	**32.26**	**67.74**	**100**

Chi square test of independence: Style and Class

Variables:	Style Class
H_0:	Style is independent of Class
H_1:	**Style is not independent of Class**
Notes:	This test is not valid, according to a general rule of thumb, because there are fewer than 5 expected cases for the Macroschematic-like motifs. Strictly speaking, none of the motifs analyzed in the study area are considered to be Macroschematic, therefore the following analysis combines these with the Schematic motifs.

Observed *O = observed frequency*

Count - MotifNum	Style			
Class	Levantine	Schematic	Semi-naturalistic	**Total Result**
Anthro.	84	57	20	**161**
Bisected		58	4	**62**
Circular	4	14		**18**
Linear	15	87	4	**106**
Zoom.	68	99	16	**183**
Total Result	**171**	**315**	**44**	**530**

Expected *E = row total * column total / overall total*

Class	Levantine	Schematic	Semi-naturalistic
Anthro.	51.95	95.69	13.37
Bisected	20	36.85	5.15
Circular	5.81	10.7	1.49
Linear	34.2	63	8.8
Zoom.	59.04	108.76	15.19

Chi square $(O-E)^2/E$

Class	Levantine	Schematic	Semi-naturalistic	**Total Result**
Anthro.	19.78	15.64	3.29	**38.72**
Bisected	20	12.14	0.26	**32.4**
Circular	0.56	1.02	1.49	**3.08**
Linear	10.78	9.14	2.62	**22.54**
Zoom.	1.36	0.88	0.04	**2.28**
Total Result	**52.48**	**38.82**	**7.7**	**99.01**

df = (r-1)(c-1) =	8	
P value =	15.51	**If X2 < P, accept null**
X^2 =	**99.01**	If X2 > P, reject null

X2StyleClass

Motif percentages

Class	Levantine	Schematic	Semi-naturalistic	**Total Result**
Anthropomorph	15.85	10.75	3.77	**30.38**
Bisected	0	10.94	0.75	**11.7**
Circular	0.75	2.64	0	**3.4**
Linear	2.83	16.42	0.75	**20**
Zoomorph	12.83	18.68	3.02	**34.53**
Total Result	**32.26**	**59.43**	**8.3**	**100**

Chi square test of independence: Anthropomorph and idol-like types and Access

Variables: Anthropomorph and idol-like types
Access

H_0: Anthropomorph and idol-like types is independent of Access
H_1: Anthropomorph and idol-like types is not independent of Access

Notes:

Observed *O = observed frequency*

	Anthropomorph and idol-like types															
Access	PossProp	PossStick	Archer	AsexProp	AsexStick	FemOther	FemSkirt	MaleProp	MaleStick	Round	Salam.	Thick	Phi	Bars	Ramiform	**Total**
Difficult	3	15	15	6	15		5	7	1	2	2	6	23	4	28	**132**
Easy	4	17	2	8	11	1	24	12	3	1	1		15		4	**103**
Total	**7**	**32**	**17**	**14**	**26**	**1**	**29**	**19**	**4**	**3**	**3**	**6**	**38**	**4**	**32**	**235**

Expected *E = row total * column total / overall total*

Access	PossProp	PossStick	Archer	AsexProp	AsexStick	FemOther	FemSkirt	MaleProp	MaleStick	Round	Salam.	Thick	Phi	Bars	Ramiform
Difficult	3.93	17.97	9.55	7.86	14.6	0.56	16.29	10.67	2.25	1.69	1.69	3.37	21	2.25	17.97
Easy	3.07	14.03	7.45	6.14	11.4	0.44	12.71	8.33	1.75	1.31	1.31	2.63	17	1.75	14.03

Chi square *$(O-E)^2/E$*

Access	PossProp	PossStick	Archer	AsexProp	AsexStick	FemOther	FemSkirt	MaleProp	MaleStick	Round	Salam.	Thick	Phi	Bars	Ramiform	**Total**
Difficult	0.22	0.49	3.11	0.44	0.01	0.56	7.82	1.26	0.69	0.06	0.06	2.05	0.1	1.37	5.59	**23.88**
Easy	0.28	0.63	3.99	0.57	0.01	0.72	10.03	1.62	0.89	0.08	0.08	2.63	0.2	1.75	7.17	**30.6**
Total	**0.5**	**1.12**	**7.1**	**1.01**	**0.02**	**1.28**	**17.85**	**2.88**	**1.58**	**0.13**	**0.13**	**4.68**	**0.3**	**3.12**	**12.76**	**54.48**

df = (r-1)(c-1) =	14	
P value =	23.69	If X2 < P, accept null
X^2 =	**54.48**	**If X2 > P, reject null**

Motif percentages

Access	PossProp	PossStick	Archer	AsexProp	AsexStick	FemOther	FemSkirt	MaleProp	MaleStick	Round	Salam.	Thick	Phi	Bars	Ramiform	**Total**
Difficult	1.28	6.38	6.38	2.55	6.38	0	2.13	2.98	0.43	0.85	0.85	2.55	9.8	1.7	11.91	**56.17**
Easy	1.7	7.23	0.85	3.4	4.68	0.43	10.21	5.11	1.28	0.43	0.43	0	6.4	0	1.7	**43.83**
Total	**2.98**	**13.62**	**7.23**	**5.96**	**11.06**	**0.43**	**12.34**	**8.09**	**1.7**	**1.28**	**1.28**	**2.55**	**16**	**1.7**	**13.62**	**100**

Chi square test of independence: Anthropomorph and idol-like types and Viewshed

Variables: Anthropomorph and idol-like types
Viewshed

H_0: Anthropomorph and idol-like types is independent of Viewshed
H_1: Anthropomorph and idol-like types is not independent of Viewshed

Notes:

Observed *O = observed frequency*

Anthropomorph and idol-like types

Viewshed	PossProp	PossStick	Archer	AsexProp	AsexStick	FemOther	FemSkirt	MaleProp	MaleStick	Round	Salam.	Thick	Phi	Bars	Ramiform	**Total**
Restricted		6	13	3	12		22	8	1	1	2	4	21	1	4	**98**
Wide Vista	7	26	4	11	14	1	7	11	3	2	1	2	17	3	28	**137**
Total	**7**	**32**	**17**	**14**	**26**	**1**	**29**	**19**	**4**	**3**	**3**	**6**	**38**	**4**	**32**	**235**

Expected *E = row total * column total / overall total*

Viewshed	PossProp	PossStick	Archer	AsexProp	AsexStick	FemOther	FemSkirt	MaleProp	MaleStick	Round	Salam.	Thick	Phi	Bars	Ramiform
Restricted	2.33	10.67	5.67	4.67	8.67	0.33	9.67	6.33	1.33	1	1	2	13	1.33	10.67
Wide Vista	4.67	21.33	11.33	9.33	17.33	0.67	19.33	12.67	2.67	2	2	4	25	2.67	21.33

Chi square $(O-E)^2/E$

Viewshed	PossProp	PossStick	Archer	AsexProp	AsexStick	FemOther	FemSkirt	MaleProp	MaleStick	Round	Salam.	Thick	Phi	Bars	Ramiform	**Total**
Restricted	2.33	2.04	9.49	0.6	1.28	0.33	15.74	0.44	0.08	0	1	2	5.5	0.08	4.17	**45.07**
Wide Vista	1.17	1.02	4.75	0.3	0.64	0.17	7.87	0.22	0.04	0	0.5	1	2.7	0.04	2.08	**22.53**
Total	**3.5**	**3.06**	**14.24**	**0.89**	**1.92**	**0.5**	**23.6**	**0.66**	**0.13**	**0**	**1.5**	**3**	**8.2**	**0.13**	**6.25**	**67.6**

df = (r-1)(c-1) =	14	
P value =	23.69	If X2 < P, accept null
X^2 =	**67.6**	**If X2 > P, reject null**

Motif percentages

Viewshed	PossProp	PossStick	Archer	AsexProp	AsexStick	FemOther	FemSkirt	MaleProp	MaleStick	Round	Salam.	Thick	Phi	Bars	Ramiform	**Total**
Restricted	0	2.55	5.53	1.28	5.11	0	9.36	3.4	0.43	0.43	0.85	1.7	8.9	0.43	1.7	**41.7**
Wide Vista	2.98	11.06	1.7	4.68	5.96	0.43	2.98	4.68	1.28	0.85	0.43	0.85	7.2	1.28	11.91	**58.3**
Total	**2.98**	**13.62**	**7.23**	**5.96**	**11.06**	**0.43**	**12.34**	**8.09**	**1.7**	**1.28**	**1.28**	**2.55**	**16**	**1.7**	**13.62**	**100**

Chi square test of independence: Anthropomorph and idol-like types and Visibility

Variables: Anthropomorph and idol-like types
Visibility

H_0: Anthropomorph and idol-like types is independent of Visibility

H_1: Anthropomorph and idol-like types is not independent of Visibility

Notes:

Observed *O = observed frequency*

	Anthropomorph and idol-like types															
Visibility	PossProp	PossStick	Archer	AsexProp	AsexStick	FemOther	FemSkirt	MaleProp	MaleStick	Round	Salam.	Thick	Phi	Bars	Ramiform	**Total**
Hidden	3	18	15	9	15		23	15	1	3	3	6	34	4	29	**178**
Seen	4	14	2	5	11	1	6	4	3				4		3	**57**
Total	**7**	**32**	**17**	**14**	**26**	**1**	**29**	**19**	**4**	**3**	**3**	**6**	**38**	**4**	**32**	**235**

Expected *E = row total * column total / overall total*

Visibility	PossProp	PossStick	Archer	AsexProp	AsexStick	FemOther	FemSkirt	MaleProp	MaleStick	Round	Salam.	Thick	Phi	Bars	Ramiform
Hidden	5.3	24.24	12.88	10.6	19.69	0.76	21.97	14.39	3.03	2.27	2.27	4.54	28.8	3.03	24.24
Seen	1.7	7.76	4.12	3.4	6.31	0.24	7.03	4.61	0.97	0.73	0.73	1.46	9.22	0.97	7.76

Chi square $(O-E)^2/E$

Visibility	PossProp	PossStick	Archer	AsexProp	AsexStick	FemOther	FemSkirt	MaleProp	MaleStick	Round	Salam.	Thick	Phi	Bars	Ramiform	**Total**
Hidden	1	1.61	0.35	0.24	1.12	0.76	0.05	0.03	1.36	0.23	0.23	0.47	0.95	0.31	0.94	**9.63**
Seen	3.12	5.01	1.09	0.76	3.49	2.37	0.15	0.08	4.25	0.73	0.73	1.46	2.95	0.97	2.92	**30.08**
Total	**4.12**	**6.62**	**1.44**	**1**	**4.61**	**3.12**	**0.2**	**0.11**	**5.61**	**0.96**	**0.96**	**1.92**	**3.9**	**1.28**	**3.86**	**39.71**

df = (r-1)(c-1) =	14	
P value =	23.69	If X2 < P, accept null
X^2 =	**39.71**	**If X2 > P, reject null**

Motif percentages

Visibility	PossProp	PossStick	Archer	AsexProp	AsexStick	FemOther	FemSkirt	MaleProp	MaleStick	Round	Salam.	Thick	Phi	Bars	Ramiform	**Total**
Hidden	1.28	7.66	6.38	3.83	6.38	0	9.79	6.38	0.43	1.28	1.28	2.55	14.5	1.7	12.34	**75.74**
Seen	1.7	5.96	0.85	2.13	4.68	0.43	2.55	1.7	1.28	0	0	0	1.7	0	1.28	**24.26**
Total	**2.98**	**13.62**	**7.23**	**5.96**	**11.06**	**0.43**	**12.34**	**8.09**	**1.7**	**1.28**	**1.28**	**2.55**	**16.2**	**1.7**	**13.62**	**100**

Chi square test of independence: Zoomorph type and Viewshed

Variables: Zoomorph type
Viewshed

H_0: Zoomorph type is independent of Viewshed

H_1: Zoomorph type is not independent of Viewshed

Notes: Due to the small sample size, indeterminate species and possible zoomorphs were combined. This test is not entirely reliable due to the low expected numbers of some motif types.

Observed *O = observed frequency*

	Zoomorph type							
Viewshed	Boar	Bull	Caprid	Cervid	Equid	ZoomIndet	ZoomPoss.	**Total**
Restricted	5	1	11	5	10	13	5	**50**
Wide Vista	1	19	24	14	12	35	27	**132**
Total	**6**	**20**	**35**	**19**	**22**	**48**	**32**	**182**

Expected *E = row total * column total / overall total*

Viewshed	Boar	Bull	Caprid	Cervid	Equid	ZoomIndet	ZoomPoss.
Restricted	1.65	5.49	9.62	5.22	6.04	13.19	8.79
Wide Vista	4.35	14.51	25.38	13.78	15.96	34.81	23.21

Chi square $(O\text{-}E)^2/E$

Viewshed	Boar	Bull	Caprid	Cervid	Equid	ZoomIndet	ZoomPoss.	Total
Restricted	6.82	3.68	0.2	0.01	2.59	0	1.63	**13.29**
Wide Vista	2.58	1.39	0.08	0	0.98	0	0.62	**5.03**
Total	**9.4**	**5.07**	**0.27**	**0.01**	**3.57**	**0**	**2.25**	**18.33**

df = (r-1)(c-1) = 6
P value = 12.59 If X2 < P, accept null
X^2 = **18.33** **If X2 > P, reject null**

Motif percentages

Viewshed	Boar	Bull	Caprid	Cervid	Equid	ZoomIndet	ZoomPoss.	**Total**
Restricted	2.75	0.55	6.04	2.75	5.49	7.14	2.75	**27.47**
Wide Vista	0.55	10.44	13.19	7.69	6.59	19.23	14.84	**72.53**
Total	**3.3**	**10.99**	**19.23**	**10.44**	**12.09**	**26.37**	**17.58**	**100**

Chi square test of independence: Zoomorph type and Access

Variables:	Zoomorph type
	Access

H_0: Zoomorph type is independent of Access

H_1: Zoomorph type is not independent of Access

Notes: Due to the small sample size, indeterminate species and possible zoomorphs were combined. This test is not entirely reliable due to the low expected numbers of some motif types.

Observed *O = observed frequency*

	Zoomorph type							
Access	Boar	Bull	Caprid	Cervid	Equid	ZoomIndet	ZoomPoss.	**Total**
Difficult	1	2	9	7	13	11	10	**53**
Easy	5	18	26	12	9	37	22	**129**
Total	**6**	**20**	**35**	**19**	**22**	**48**	**32**	**182**

Expected *E = row total * column total / overall total*

Access	Boar	Bull	Caprid	Cervid	Equid	ZoomIndet	ZoomPoss.
Difficult	1.75	5.82	10.19	5.53	6.41	13.98	9.32
Easy	4.25	14.18	24.81	13.47	15.59	34.02	22.68

Chi square $(O\text{-}E)^2/E$

Access	Boar	Bull	Caprid	Cervid	Equid	ZoomIndet	ZoomPoss.	Total
Difficult	0.32	2.51	0.14	0.39	6.79	0.63	0.05	**10.78**
Easy	0.13	1.03	0.06	0.16	2.79	0.26	0.02	**4.43**
Total	**0.45**	**3.54**	**0.2**	**0.55**	**9.57**	**0.9**	**0.07**	**15.21**

df = (r-1)(c-1) =	5	
P value =	11.07	If X2 < P, accept null
X^2 =	**15.21**	**If X2 > P, reject null**

Motif percentages

Access	Boar	Bull	Caprid	Cervid	Equid	ZoomIndet	ZoomPoss.	Total
Difficult	0.55	1.1	4.95	3.85	7.14	6.04	5.49	**29.12**
Easy	2.75	9.89	14.29	6.59	4.95	20.33	12.09	**70.88**
Total	**3.3**	**10.99**	**19.23**	**10.44**	**12.09**	**26.37**	**17.58**	**100**

Chi square test of independence: Zoomorph type and Visibility

Variables: Zoomorph type
Visibility

H_0: Zoomorph type is independent of Visibility

H_1: Zoomorph type is not independent of Visibility

Notes: Due to the small sample size, indeterminate species and possible zoomorphs were combined. This test is not entirely reliable due to the low expected numbers of some motif types.

Observed *O = observed frequency*

	Zoomorph type							
Visibility	Boar	Bull	Caprid	Cervid	Equid	ZoomIndet	ZoomPoss.	**Total**
Hidden	6	2	20	8	14	20	11	**81**
Seen		18	15	11	8	28	21	**101**
Total	**6**	**20**	**35**	**19**	**22**	**48**	**32**	**182**

Expected *E = row total * column total / overall total*

Visibility	Boar	Bull	Caprid	Cervid	Equid	ZoomIndet	ZoomPoss.
Hidden	2.67	8.9	15.58	8.46	9.79	21.36	14.24
Seen	3.33	11.1	19.42	10.54	12.21	26.64	17.76

Chi square $(O-E)^2/E$

Visibility	Boar	Bull	Caprid	Cervid	Equid	ZoomIndet	ZoomPoss.	Total
Hidden	4.15	5.35	1.26	0.02	1.81	0.09	0.74	**12.68**
Seen	3.33	4.29	1.01	0.02	1.45	0.07	0.59	**10.17**
Total	**7.48**	**9.64**	**2.26**	**0.04**	**3.26**	**0.16**	**1.33**	**22.85**

df = (r-1)(c-1) =	6	
P value =	12.59	If X2 < P, accept null
X^2 =	**22.85**	**If X2 > P, reject null**

Motif percentages

Visibility	Boar	Bull	Caprid	Cervid	Equid	ZoomIndet	ZoomPoss.	Total
Hidden	3.3	1.1	10.99	4.4	7.69	10.99	6.04	**44.51**
Seen	0	9.89	8.24	6.04	4.4	15.38	11.54	**55.49**
Total	**3.3**	**10.99**	**19.23**	**10.44**	**12.09**	**26.37**	**17.58**	**100**

Chi square test of independence: Zoomorph type and Landform

Variables: Zoomorph type
Landform

H_0: Zoomorph type is independent of Landform

H_1: Zoomorph type is not independent of Landform

Notes: Due to the small sample size, indeterminate species and possible zoomorphs were combined. This test is not entirely reliable due to the low expected numbers of some motif types.

Observed *O = observed frequency*

	Zoomorph type							
Landform	Boar	Bull	Caprid	Cervid	Equid	Zoom (Indet.)	Zoom (Poss.)	**Total**
Canyon	5	0	16	2	10	13	4	**50**
Peak	1	5	9	10	7	15	17	**64**
Valley	0	15	10	7	5	20	11	**68**
Total	**6**	**20**	**35**	**19**	**22**	**48**	**32**	**182**

Expected *E = row total * column total / overall total*

Landform	Boar	Bull	Caprid	Cervid	Equid	Zoom (Indet.)	Zoom (Poss.)
Canyon	1.65	5.49	9.62	5.22	6.04	13.19	8.79
Peak	2.11	7.03	12.31	6.68	7.74	16.88	11.25
Valley	2.24	7.47	13.08	7.1	8.22	17.93	11.96

Chi square $(O\text{-}E)^2/E$

Landform	Boar	Bull	Caprid	Cervid	Equid	Zoom (Indet.)	Zoom (Poss.)	Total
Canyon	6.82	5.49	4.24	1.99	2.59	0	2.61	**23.74**
Peak	0.58	0.59	0.89	1.65	0.07	0.21	2.94	**6.92**
Valley	2.24	7.58	0.72	0	1.26	0.24	0.08	**12.13**
Total	**9.64**	**13.66**	**5.85**	**3.64**	**3.92**	**0.45**	**5.62**	**42.79**

df = (r-1)(c-1) =	6	
P value =	12.59	If X2 < P, accept null
X^2 =	**42.79**	**If X2 > P, reject null**

Motif percentages

Landform	Boar	Bull	Caprid	Cervid	Equid	Zoom (Indet.)	Zoom (Poss.)	Total
Canyon	2.75	0	8.79	1.1	5.49	7.14	2.2	**27.47**
Peak	0.55	2.75	4.95	5.49	3.85	8.24	9.34	**35.16**
Valley	0	8.24	5.49	3.85	2.75	10.99	6.04	**37.36**
Total	**3.3**	**10.99**	**19.23**	**10.44**	**12.09**	**26.37**	**17.58**	**100**

Chi square test of independence: Zoomorph type and Landform

Variables: Zoomorph type
Landform

H_0: Zoomorph type is independent of Landform

H_1: Zoomorph type is not independent of Landform

Notes: Due to the small sample size, indeterminate species and possible zoomorphs were combined. This test is not entirely reliable due to the low expected numbers of some motif types.

Observed *O = observed frequency*

	Zoomorph type							
Landform	Boar	Bull	Caprid	Cervid	Equid	ZoomIndet	ZoomPoss.	**Total**
Canyon	5	0	16	2	10	13	4	**50**
Peak	1	5	9	10	7	15	17	**64**
Valley		15	10	7	5	20	11	**68**
Total	**6**	**20**	**35**	**19**	**22**	**48**	**32**	**182**

Expected *E = row total * column total / overall total*

Landform	Boar	Bull	Caprid	Cervid	Equid	ZoomIndet	ZoomPoss.
Canyon	1.65	5.49	9.62	5.22	6.04	13.19	8.79
Peak	2.11	7.03	12.31	6.68	7.74	16.88	11.25
Valley	2.24	7.47	13.08	7.1	8.22	17.93	11.96

Chi square $(O-E)^2/E$

Landform	Boar	Bull	Caprid	Cervid	Equid	ZoomIndet	ZoomPoss.	Total
Canyon	6.82	5.49	4.24	1.99	2.59	0	2.61	**23.74**
Peak	0.58	0.59	0.89	1.65	0.07	0.21	2.94	**6.92**
Valley	2.24	7.58	0.72	0	1.26	0.24	0.08	**12.13**
Total	**9.64**	**13.66**	**5.85**	**3.64**	**3.92**	**0.45**	**5.62**	**42.79**

df = (r-1)(c-1) =	12	
P value =	21.03	If X2 < P, accept null
X^2 =	**42.79**	**If X2 > P, reject null**

Motif percentages

Landform	Boar	Bull	Caprid	Cervid	Equid	ZoomIndet	ZoomPoss.	**Total**
Canyon	2.75	0	8.79	1.1	5.49	7.14	2.2	**27.47**
Peak	0.55	2.75	4.95	5.49	3.85	8.24	9.34	**35.16**
Valley	0	8.24	5.49	3.85	2.75	10.99	6.04	**37.36**
Total	**3.3**	**10.99**	**19.23**	**10.44**	**12.09**	**26.37**	**17.58**	**100**

Appendix C

Chi-square test results, per panel

Using a series of database views that generate every possible combination of the independent and dependent attributes (as selected), along with the presence of sites or panels that have these attributes, initially a view of the observed contingency table for each combination is generated.

Additionally views are generated calculate the total members of each row and column of the contingency table, and the total number of members of the table, which are fed into $\frac{(Row\ Total)\times(Col\ Total)}{N}$ to calculate the expected contingency table entries as another view.

The value for $\frac{(O_i-E_i)^2}{E_i}$ is calculated for each cell of each possible combination from the joined observed and expected contingency views, and an aggregation is performed to calculate the sum of these values for each combination (which is ^{2}), which is presented as another database view.

A similar procedure is used to calculate with Yates' correction applied using the formula $\frac{(|O_i-E_i|-0.5)^2}{E_i}$, which is presented as a further database view

Another aggregate view shows the minimum expected value in any cell of the combination of attributes, and if this is below 5, the “automatic” ^{2} view uses the value with Yates' correction applied, and if not, the normal ^{2}

Phi is calculated using the following formula $\phi=\frac{O_{1,1}O_{0,0}-O_{1,0}O_{0,1}}{\sqrt{\prod(Row\ Totals)\times\prod(Col\ Totals)}}$, again using a series of aggregating database views to calculate the numerator and denominator of the above expression, for each possible combination.

For each test statistic, the critical value of 3.841 is used, because there is only one degree of freedom, to calculate whether the result is significant or not. This has been combined with the result for Φ to present a non-zero value only when significant, in another series of views.

Finally, a stored procedure is used to generate a temporary table containing the content of all of the test results, which is then passed to another stored procedure to pivot the data as a cross-tab, which is presented in the tables in this appendix.

			Anthropomorph				Bisected			Circular			Linear						Zoomorph					
		Amorphous	AnthPoss	Asexual	Female	Male	Bisected	Phi	PolyLobed	Circular	Curves	DotsGroup	Bars	Crook	Grid	IdolLike	Lines	Ramiform	Boar	Bull	Caprid	Cervid	Equid	Quadruped
	Amorphous		1.21	0	0.14	0.39	0.06	0.08	0.03	0.86	0.03	0.27	0.06	2.42	0.06	0.07	2.38	0.15	0.06	0.01	0.18	0.26	2.42	1.47
Anthropo-morph	AnthPoss	1.21		4.58	0.05	2.07	1.09	3.68	1.89	0	1.89	0	0.11	1.88	5.84	3.63	3.9	0.04	1.09	0	3.9	0.03	6.01	1.56
	Asexual	0	4.58		1.64	6.54	1.51	0.04	2.94	0.01	2.94	0.01	0.04	0.23	1.51	1.86	3.13	0.93	0.04	1.58	0.18	0.01	2.6	0.27
	Female	0.14	0.05	1.64		12.6	0.02	1.22	1.98	0.03	1.16	0.03	0.02	0.34	0.02	0.07	0.39	0.81	1.77	1.94	0.39	3.62	0.34	0.04
	Male	0.39	2.07	6.54	12.6		1.51	0.27	0.01	0.01	6.35	0.01	0.04	2.6	0.04	0.24	5.97	0	0.04	1.58	1.2	2.94	0.23	3.13
Bisect-ed	Bisected	0.06	1.09	1.51	0.02	1.51		0.07	2.45	1.95	0	1.95	1.04	0.36	1.04	3.45	4.86	5.04	1.04	0.21	0.78	0	0.36	0.23
	Phi	0.08	3.68	0.04	1.22	0.27	0.07		5.41	0	0	0	1.28	0.15	0.07	0.13	0.19	0.01	0.07	0.81	0.78	0.66	0.15	0.11
	PolyLobed	0.03	1.89	2.94	1.98	0.01	2.45	5.41		0.1	0.32	0.1	0	0.66	2.45	3.59	0.16	0.11	0	0.31	0.11	0.1	0.66	0.09
Circu-lar	Circular	0.86	0	0.01	0.03	0.01	1.95	0	0.1		0.1	3.33	1.95	0.87	1.95	0.22	0.01	0.43	1.95	0.61	0.01	0.1	0.87	0.13
	Curves	0.03	1.89	2.94	1.16	6.35	0	0	0.32	0.1		0.1	2.45	0.66	0	3.59	3.29	0.11	0	0.31	0.11	0.1	0.18	0.97
	DotsGroup	0.27	0	0.01	0.03	0.01	1.95	0	0.1	3.33	0.1		1.95	0.87	1.95	6.47	2.31	0.43	1.95	0.61	0.01	0.1	0.87	1.28
Linear	Bars	0.06	0.11	0.04	0.02	0.04	1.04	1.28	0	1.95	2.45	1.95		0.36	1.04	12.7	0.19	5.04	1.04	0.21	0.19	0	0.36	2.91
	Crook	2.42	1.88	0.23	0.34	2.6	0.36	0.15	0.66	0.87	0.66	0.87	0.36		0.36	5.94	1.35	0	0.36	0	0.01	0.18	0.04	2.54
	Grid	0.06	5.84	1.51	0.02	0.04	1.04	0.07	2.45	1.95	0	1.95	1.04	0.36		3.45	0.19	0.11	1.04	0.21	0.78	9.87	0.36	0.23
	IdolLike	0.07	3.63	1.86	0.07	0.24	3.45	0.13	3.59	0.22	3.59	6.47	12.7	5.94	3.45		2.6	8.6	0.02	0.17	0.65	0.88	0.07	5.59
	Lines	2.38	3.9	3.13	0.39	5.97	4.86	0.19	0.16	0.01	3.29	2.31	0.19	1.35	0.19	2.6		0.25	0.19	0.02	0.09	0.11	0.01	1.83
	Ramiform	0.15	0.04	0.93	0.81	0	5.04	0.01	0.11	0.43	0.11	0.43	5.04	0	0.11	8.6	0.25		0.11	0.04	0.15	1.97	2.08	5.84
Zoomorph	Boar	0.06	1.09	0.04	1.77	0.04	1.04	0.07	0	1.95	0	1.95	1.04	0.36	1.04	0.02	0.19	0.11		0.21	0.78	0	0.36	0.23
	Bull	0.01	0	1.58	1.94	1.58	0.21	0.81	0.31	0.61	0.31	0.61	0.21	0	0.21	0.17	0.02	0.04	0.21		3.1	2.88	2.79	0.06
	Caprid	0.18	3.9	0.18	0.39	1.2	0.78	0.78	0.11	0.01	0.11	0.01	0.19	0.01	0.78	0.65	0.09	0.15	0.78	3.1		0.11	10.5	1.83
	Cervid	0.26	0.03	0.01	3.62	2.94	0	0.66	0.1	0.1	0.1	0.1	0	0.18	9.87	0.88	0.11	1.97	0	2.88	0.11		0.18	2.79
	Equid	2.42	6.01	2.6	0.34	0.23	0.36	0.15	0.66	0.87	0.18	0.87	0.36	0.04	0.36	0.07	0.01	2.08	0.36	2.79	10.5	0.18		2.54
	Quadruped	1.47	1.56	0.27	0.04	3.13	0.23	0.11	0.09	0.13	0.97	1.28	2.91	2.54	0.23	5.59	1.83	5.84	0.23	0.06	1.83	2.79	2.54	

Figure 0.1: Chi square analysis 1: Type combinations per panel. Red text denotes tests for which the expected value was less than 5, necessitating the use of Yates' correction.

			Anthropomorph				Bisected			Circular			Linear						Zoomorph					
		Amorphous	AnthPoss	Asexual	Female	Male	Bisected	Phi	PolyLobed	Circular	Curves	DotsGroup	Bars	Crook	Grid	IdolLike	Lines	Ramiform	Boar	Bull	Caprid	Cervid	Equid	Quadruped
	Amorphous																							
Anthropo-morph	AnthPoss			0.31											0.38		0.28				0.28		0.37	
	Asexual		0.31			0.36																		
	Female					0.49																		
	Male			0.36	0.49						0.36						0.34							
Bisect-ed	Bisected																0.36	0.4						
	Phi								0.34															
	PolyLobed							0.34																
Circu-lar	Circular																							
	Curves					0.36																		
	DotsGroup															0.44								
Linear	Bars															0.55		0.4						
	Crook															0.39								
	Grid		0.38																			0.49		
	IdolLike											0.44	0.55	0.39				0.44						0.34
	Lines		0.28			0.34	0.36																	
	Ramiform						0.4						0.4			0.44								0.35
Zoomorph	Boar																							
	Bull																							
	Caprid		0.28																				0.47	
	Cervid														0.49									
	Equid		0.37																		0.47			
	Quadruped															0.34		0.35						

Figure 0.2: Phi coefficient analysis 1: Values closer to 1 are more strongly associated. Tests were only calculated for combinations which are statistically significant.

			Anthropomorph			Bisected			Linear			Zoomorph					
		Amorphous	AnthOther	Female	Male	Bisected	Phi	Circular	Bars&Grids	IdolLike	Linear	Boar	Bull	Caprid	Cervid	Equid	Quadruped
	Amorphous		0	0.14	0.39	0.01	0.08	0.1	0.01	0.57	3.85	0.06	0.01	0.18	0.26	2.42	1.47
Anthro-pomorph	AnthOther	0		0.34	2.58	2.27	2.75	2.75	4.54	2.27	2.7	0.29	0.11	0.89	0.07	2.84	0.07
	Female	0.14	0.34		12.57	2.31	1.22	0.14	0.1	0.52	0.11	1.77	1.94	0.39	3.62	0.34	0.04
	Male	0.39	2.58	12.57		0	0.27	2.64	0.05	0.51	7.51	0.04	1.58	1.2	2.94	0.23	3.13
Bisec ted	Bisected	0.01	2.27	2.31	0		4.29	0.31	2.36	7.32	0.02	0.01	0.19	0.02	0.16	0.48	0
	Phi	0.08	2.75	1.22	0.27	4.29		0	1.29	0.04	0.01	0.07	0.81	0.78	0.66	0.15	0.11
	Circular	0.1	2.75	0.14	2.64	0.31	0		4.63	8.01	6.14	0.07	0.01	0.05	0	0.15	4.46
Linear	Bars&Grids	0.01	4.54	0.1	0.05	2.36	1.29	4.63		14.04	0.37	0.21	0.01	0.64	2.88	0	4.11
	IdolLike	0.57	2.27	0.52	0.51	7.32	0.04	8.01	14.04		3.78	0.01	0.19	0.71	1.57	0.48	7.27
	Linear	3.85	2.7	0.11	7.51	0.02	0.01	6.14	0.37	3.78		0.29	0.1	0.08	0.01	0	4.05
Zoomorph	Boar	0.06	0.29	1.77	0.04	0.01	0.07	0.07	0.21	0.01	0.29		0.21	0.78	0	0.36	0.23
	Bull	0.01	0.11	1.94	1.58	0.19	0.81	0.01	0.01	0.19	0.1	0.21		3.1	2.88	2.79	0.06
	Caprid	0.18	0.89	0.39	1.2	0.02	0.78	0.05	0.64	0.71	0.08	0.78	3.1		0.11	10.5	1.83
	Cervid	0.26	0.07	3.62	2.94	0.16	0.66	0	2.88	1.57	0.01	0	2.88	0.11		0.18	2.79
	Equid	2.42	2.84	0.34	0.23	0.48	0.15	0.15	0	0.48	0	0.36	2.79	10.5	0.18		2.54
	Quadruped	1.47	0.07	0.04	3.13	0	0.11	4.46	4.11	7.27	4.05	0.23	0.06	1.83	2.79	2.54	

Figure 0.3: Chi square analysis 2: Type combinations per panel. Red text denotes tests for which the expected value was less than 5, necessitating the use of Yates' correction.

			Anthropomorph			Bisected			Linear			Zoomorph					
		Amorphous	AnthOther	Female	Male	Bisected	Phi	Circular	Bars&Grids	IdolLike	Linear	Boar	Bull	Caprid	Cervid	Equid	Quadruped
	Amorphous										0.24						
Anthro-pomorph	AnthOther								0.32								
	Female				0.49												
	Male			0.49							0.38						
Bisected	Bisected						0.3			0.39							
	Phi					0.3											
	Circular								0.33	0.4	0.35						0.26
Linear	Bars&Grids		0.32					0.33		0.53							0.31
	IdolLike					0.39		0.4	0.53								0.38
	Linear	0.24			0.38			0.35									0.25
Zoomorph	Boar																
	Bull																
	Caprid															0.47	
	Cervid																
	Equid													0.47			
	Quadruped							0.26	0.31	0.38	0.25						

Figure 0.4: Phi coefficient analysis 2. Values closer to 1 are more strongly associated. Tests were only calculated for combinations which are statistically significant.

			Anthropomorph			Bisected			Linear			Zoomorph					
		Amorphous	AnthOther	Female	Male	Bisected	Phi	Circular	Bars&Grids	IdolLike	Linear	Boar	Bull	Caprid	Cervid	Equid	Quadruped
Viewshed	Restricted	1.77	0.33	0.12	1.43	0.05	0.23	0.05	0.01	0.03	1.07	0.31	1.02	1.46	0.89	0.09	2.18
	Wide Vista	1.77	0.33	0.12	1.43	0.05	0.23	0.05	0.01	0.03	1.07	0.31	1.02	1.46	0.89	0.09	2.18
Visibility	Hidden	0.58	0.58	0.12	0.19	0.31	1.88	0.04	0.18	0.08	0.01	0.08	1.83	1.51	0.31	0.04	0.11
	Seen	0.58	0.58	0.12	0.19	0.31	1.88	0.04	0.18	0.08	0.01	0.08	1.83	1.51	0.31	0.04	0.11
Access	Difficult	0.72	0.72	0.06	0.15	0	0.48	0	0.06	0.98	0	0.39	0.41	2.81	0	0.03	0.56
	Easy	0.72	0.72	0.06	0.15	0	0.48	0	0.06	0.98	0	0.39	0.41	2.81	0	0.03	0.56
Landform	Canyon	2.63	0.12	0.89	0.11	0	0.17	0	0	0.11	2.13	0.23	3.18	0.09	4.8	0.17	3.35
	Peak	1.71	0	5.34	1.63	0.02	0	0.76	0.02	0.02	4.37	0.17	1.1	0.44	2.54	0.19	2.76
	Valley	0	0	1.43	0.53	0.1	0	0.33	0.13	0.02	0.12	0.04	0.13	0.62	0.1	0.33	0.03
Elevation	High	2.85	0.07	0.03	0.01	0.12	0.03	0.12	0.08	0.63	0.11	0.12	0.08	2.49	0.12	0.11	0
	Middle	0.31	0.31	0.01	0.02	0	0.04	0	0.18	0.02	0.12	1.83	0.18	0.31	0	0.32	0.39
	Low	3.35	0.76	0.08	0.26	0	0.07	0	0.32	1.56	0.03	0.04	0.15	2.4	0	0.01	0
Shelter	Cave	0.66	0.01	0.07	4.23	0.02	0.07	0.02	0	0.12	0.01	2.92	0	0.01	0.02	0.1	0.01
	Shelter	0.66	0.01	0.07	4.23	0.02	0.07	0.02	0	0.12	0.01	2.92	0	0.01	0.02	0.1	0.01

Figure 0.5: Chi square analysis 3: Type combinations per panel. Red text denotes tests for which the expected value was less than 5, necessitating the use of Yates' correction.

		Anthropomorph				Bisected			Linear			Zoomorph					
		Amorphous	AnthOther	Female	Male	Bisected	Phi	Circular	Bars&Grids	IdolLike	Linear	Boar	Bull	Caprid	Cervid	Equid	Quadruped
Viewshed	Restricted																
	Wide Vista																
Visibility	Hidden																
	Seen																
Access	Difficult																
	Easy																
Landform	Canyon														-0.4		
	Peak			0.42							0.33						
	Valley																
Elevation	High																
	Middle																
	Low																
Shelter	Cave				0.38												
	Shelter				-0.38												

Figure 0.6: Phi coefficient analysis 3: Values closer to 1 are more strongly associated. Tests were only calculated for combinations which are statistically significant.

		Amorphous	Levantine	Schematic	Semi-naturalistic
Viewshed	Restricted	1.77	2.46	0.01	3.42
	Wide Vista	1.77	2.46	0.01	3.42
Visibility	Hidden	0.58	0.08	0.18	0.92
	Seen	0.58	0.08	0.18	0.92
Access	Difficult	0.72	0.98	0.06	2.04
	Easy	0.72	0.98	0.06	2.04
Landform	Canyon	2.63	1.06	0	0.03
	Peak	1.71	0.33	1.1	1.03
	Valley	0	0.02	0.56	0.14
Elevation	High	2.85	0.01	0.41	1.11
	Middle	0.31	0.02	0.18	0.55
	Low	3.35	0.26	0.15	0.76
Shelter	Cave	0.66	0.12	0	9.57
	Shelter	0.66	0.12	0	9.57

Figure 0.7: Chi square analysis 4: Type combinations per panel. Red text denotes tests for which the expected value was less than 5, necessitating the use of Yates' correction.

		Amorphous	Levantine	Schematic	Semi-naturalistic
Viewshed	Restricted				
	Wide Vista				
Visibility	Hidden				
	Seen				
Access	Difficult				
	Easy				
Landform	Canyon				
	Peak				
	Valley				
Elevation	High				
	Middle				
	Low				
Shelter	Cave				0.58
	Shelter				-0.58

Figure 0.8: Phi coefficident analysis 4: Values closer to 1 are more strongly associated. Tests were only calculated for combinations which are statistically significant.

Appendix D

Cluster analysis statistics

Cluster analysis 1: hierarchical cluster, all variables

Import data into *rattle*, mark the variables to consider

This run includes all the variables, coded as presence or absence. Variables in this case are the motif type, viewshed, visibility, access, elevation, landform, shelter, and style.

```
# Note the user selections.

# Build the training/validate/test datasets.

set.seed(crv$seed)
crs$nobs <- nrow(crs$dataset) # 41 observations
crs$sample <- crs$train <- sample(nrow(crs$dataset), 0.68*crs$nobs)
# 28 observations
crs$validate <- sample(setdiff(seq_len(nrow(crs$dataset)), crs$train), 0.15*crs$nobs)
# 6 observations
crs$test <- setdiff(setdiff(seq_len(nrow(crs$dataset)), crs$train), crs$validate)
# 7 observations

# The following variable selections have been noted.

crs$input <- c("Amorphous", "Linear", "AnthPossProp", "AnthPossStick",
     "Archer", "AsexProp", "AsexStick", "FemOther",
     "FemSkirt", "MaleProp", "MaleStick", "Round",
     "Salamander", "Thick", "Anchor", "Bisected",
     "Phi", "PolyLobed", "DotsGroup", "Lines",
     "RayCircle", "Bars", "Comb", "Crook",
     "Grid", "Lines.1", "LinesCurved", "LinesGroup",
     "LinesIntersecting", "Projectile", "Ramiform", "RamiformEyed",
     "RamiformHead", "Straight", "Triangular", "WavyZigzag",
     "Bird", "Boar", "Bull", "BullPoss",
     "Caprid", "CapridPoss", "Cervid", "CervidPoss",
     "Equid", "EquidPoss", "Zoom..Poss..", "ZoomIndet",
     "Restricted", "Wide.Vista", "Hidden", "Seen",
     "Difficult", "Easy", "Canyon", "Peak",
     "Valley", "High", "Low", "Middle",
     "Cave", "Shelter", "L", "S",
     "LS")

crs$numeric <- c("Amorphous", "Linear", "AnthPossProp", "AnthPossStick",
     "Archer", "AsexProp", "AsexStick", "FemOther",
```

```
     "FemSkirt", "MaleProp", "MaleStick", "Round",
     "Salamander", "Thick", "Anchor", "Bisected",
     "Phi", "PolyLobed", "DotsGroup", "Lines",
     "RayCircle", "Bars", "Comb", "Crook",
     "Grid", "Lines.1", "LinesCurved", "LinesGroup",
     "LinesIntersecting", "Projectile", "Ramiform", "RamiformEyed",
     "RamiformHead", "Straight", "Triangular", "WavyZigzag",
     "Bird", "Boar", "Bull", "BullPoss",
     "Caprid", "CapridPoss", "Cervid", "CervidPoss",
     "Equid", "EquidPoss", "Zoom..Poss..", "ZoomIndet",
     "Restricted", "Wide.Vista", "Hidden", "Seen",
     "Difficult", "Easy", "Canyon", "Peak",
     "Valley", "High", "Low", "Middle",
     "Cave", "Shelter", "L", "S",
     "LS")

crs$categoric <- NULL

crs$target  <- NULL
crs$risk    <- NULL
crs$ident   <- NULL
crs$ignore  <- c("WaypointID", "SiteNum", "TotalTypes")
crs$weights <- NULL

# The 'amap' package provides the 'hclusterpar' function.

require(amap, quietly=TRUE)
```

Perform analysis

```
Hierachical Cluster

Call:
hclusterpar(x = na.omit(crs$dataset[, crs$numeric]), method = "binary",     link = "average", nbproc = 1)

Cluster method   : average
Distance         : binary
Number of objects: 41

Time taken: 0.02 secs
```

Statistics

```
======================================================================
Cluster means:

     Amorphous    Linear AnthPossProp AnthPossStick    Archer AsexProp AsexStick FemOther
[1,] 1.0000000 0.5000000         0.75     0.7500000 0.7500000     0.75 0.5000000     0.25
[2,] 0.5000000 0.6000000         0.00     0.3000000 0.0000000     0.10 0.1000000     0.00
[3,] 0.2500000 0.0000000         0.00     0.2500000 0.3333333     0.00 0.3333333     0.00
[4,] 0.3333333 0.3333333         0.00     0.4444444 0.0000000     0.00 0.2222222     0.00
[5,] 0.8333333 0.3333333         0.00     0.1666667 0.0000000     0.00 0.0000000     0.00
      FemSkirt  MaleProp MaleStick Round Salamander     Thick    Anchor   Bisected       Phi
[1,] 0.7500000 1.0000000 0.5000000  0.75 0.25000000 0.5000000 0.0000000 0.00000000 0.2500000
[2,] 0.2000000 0.0000000 0.1000000  0.00 0.00000000 0.0000000 0.1000000 0.00000000 0.3000000
[3,] 0.0000000 0.0000000 0.0000000  0.00 0.08333333 0.1666667 0.0000000 0.08333333 0.3333333
[4,] 0.0000000 0.0000000 0.1111111  0.00 0.00000000 0.0000000 0.1111111 0.00000000 0.3333333
[5,] 0.1666667 0.1666667 0.0000000  0.00 0.16666667 0.0000000 0.0000000 0.00000000 0.3333333
     PolyLobed DotsGroup      Lines  RayCircle       Bars       Comb     Crook      Grid
```

```
[1,] 0.5000000 0.0000000 1.00000000 0.00000000 0.25000000 0.25000000 0.2500000 0.2500000
[2,] 0.1000000 0.1000000 0.20000000 0.00000000 0.10000000 0.20000000 0.0000000 0.1000000
[3,] 0.3333333 0.0000000 0.08333333 0.08333333 0.08333333 0.08333333 0.0000000 0.0000000
[4,] 0.2222222 0.0000000 0.11111111 0.00000000 0.00000000 0.11111111 0.1111111 0.1111111
[5,] 0.1666667 0.1666667 0.16666667 0.16666667 0.00000000 0.16666667 0.1666667 0.0000000
     Lines.1 LinesCurved LinesGroup LinesIntersecting Projectile  Ramiform RamiformEyed
[1,]     0.0         0.5 0.50000000         0.0000000 0.50000000 0.0000000          0.0
[2,]     0.1         0.0 0.10000000         0.1000000 0.00000000 0.3000000          0.1
[3,]     0.0         0.0 0.08333333         0.1666667 0.08333333 0.1666667          0.0
[4,]     0.0         0.0 0.00000000         0.2222222 0.00000000 0.1111111          0.0
[5,]     0.0         0.0 0.33333333         0.1666667 0.16666667 0.1666667          0.0
     RamiformHead  Straight Triangular WavyZigzag      Bird       Boar       Bull  BullPoss
[1,]          0.0 0.2500000        0.5  0.2500000 0.0000000 0.25000000 0.50000000 0.0000000
[2,]          0.1 0.3000000        0.0  0.0000000 0.0000000 0.00000000 0.10000000 0.0000000
[3,]          0.0 0.0000000        0.0  0.0000000 0.0000000 0.08333333 0.08333333 0.0000000
[4,]          0.0 0.0000000        0.0  0.2222222 0.1111111 0.00000000 0.22222222 0.1111111
[5,]          0.0 0.3333333        0.0  0.0000000 0.0000000 0.00000000 0.00000000 0.0000000
        Caprid CapridPoss    Cervid CervidPoss      Equid EquidPoss Zoom..Poss.. ZoomIndet
[1,] 0.5000000 0.50000000 0.7500000 0.25000000 0.25000000 0.2500000    0.7500000 1.0000000
[2,] 0.2000000 0.10000000 0.1000000 0.20000000 0.00000000 0.0000000    0.3000000 0.3000000
[3,] 0.2500000 0.08333333 0.1666667 0.08333333 0.08333333 0.1666667    0.2500000 0.2500000
[4,] 0.5555556 0.33333333 0.2222222 0.22222222 0.00000000 0.1111111    0.3333333 0.3333333
[5,] 0.3333333 0.00000000 0.0000000 0.00000000 0.00000000 0.1666667    0.3333333 0.1666667
     Restricted Wide.Vista    Hidden      Seen Difficult Easy    Canyon      Peak    Valley
[1,]  0.2500000 0.75000000 0.7500000 0.2500000       0.5  0.5 0.2500000 0.7500000 0.0000000
[2,]  0.0000000 1.00000000 0.3000000 0.7000000       0.8  0.2 0.1000000 0.9000000 0.0000000
[3,]  0.9166667 0.08333333 1.0000000 0.0000000       1.0  0.0 0.6666667 0.3333333 0.0000000
[4,]  0.0000000 1.00000000 0.3333333 0.6666667       0.0  1.0 0.1111111 0.0000000 0.8888889
[5,]  1.0000000 0.00000000 1.0000000 0.0000000       0.0  1.0 1.0000000 0.0000000 0.0000000
          High       Low    Middle      Cave   Shelter         L         S         LS
[1,] 0.5000000 0.5000000 0.0000000 0.2500000 0.7500000 0.0000000 0.0000000 1.00000000
[2,] 1.0000000 0.0000000 0.0000000 0.0000000 1.0000000 0.3000000 0.7000000 0.00000000
[3,] 1.0000000 0.0000000 0.0000000 0.6666667 0.3333333 0.0000000 0.9166667 0.08333333
[4,] 0.2222222 0.5555556 0.2222222 0.0000000 1.0000000 0.0000000 0.6666667 0.33333333
[5,] 0.0000000 1.0000000 0.0000000 0.1666667 0.8333333 0.1666667 0.8333333 0.00000000


General cluster statistics:

$n
[1] 41

$cluster.number
[1] 5

$cluster.size
[1]  4 10 12  9  6

$diameter
[1] 5.477226 4.795832 4.690416 4.898979 4.472136

$average.distance
[1] 4.996262 3.374768 3.091693 3.509368 3.035606

$median.distance
[1] 5.142072 3.316625 3.239451 3.316625 2.828427

$separation
[1] 4.000000 2.449490 2.449490 2.645751 2.645751

$average.toother
```

```
[1] 5.163821 4.118522 4.168764 4.221159 4.107474

$separation.matrix
         [,1]     [,2]     [,3]     [,4]     [,5]
[1,] 0.000000 4.000000 4.358899 4.582576 4.582576
[2,] 4.000000 0.000000 2.449490 2.828427 3.316625
[3,] 4.358899 2.449490 0.000000 3.000000 2.645751
[4,] 4.582576 2.828427 3.000000 0.000000 2.645751
[5,] 4.582576 3.316625 2.645751 2.645751 0.000000

$average.between
[1] 4.271458

$average.within
[1] 3.320031

$n.between
[1] 652

$n.within
[1] 168

$within.cluster.ss
[1] 223.55

$clus.avg.silwidths
          1           2           3           4           5
-0.02000036  0.11091007  0.16475572  0.08334369  0.19667108

$avg.silwidth
[1] 0.1203973

$g2
NULL

$g3
NULL

$pearsongamma
[1] 0.4322582

$dunn
[1] 0.4472136

$entropy
[1] 1.544902

$wb.ratio
[1] 0.7772595

$ch
[1] 5.01618

$corrected.rand
NULL

$vi
NULL
======================================================================
```

Create .eps file in RStudio

Unfortunately, Rattle's default is to print various bits of information that are not that useful on the plot (like the file name). So we run this command in RStudio to change the default options and produce a plot without the extra details printed on it.

```
# The 'cba' package provides the 'plot' function.

require(cba, quietly=TRUE)

# Generate a dendrogram plot.

postscript(file="hclustDendroSimplesAllVars_UPDATE.eps",height=6,width=6,
    horizontal=F,onefile=F,paper="special")

# THEN
plot(crs$hclust, main="", sub="", xlab="")
rect.hclust(crs$hclust, k=5)

# THEN
dev.off()
```

Variable presence or absence per cluster

The following tables give the full details of the occurrence of motif types and landscape variables within the clusters identified in analysis 1, as noted in chapter 7.

Table D.1: Table showing the presence of absence of each motif type per cluster, and the number of cases which exhibit each variable. Cluster analysis 1 includes the landscape variables and considers the presence of absence of motif types.

Class	Type	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Amorphous	Amorphous	5	4	3	5	3
	Linear	2	2	3	2	4
Anthrpomomorph	AnthPossProp	0	0	3	0	0
	AnthPossStick	1	4	2	5	2
	Archer	0	3	3	1	0
	AsexProp	0	0	2	1	1
	AsexStick	0	3	1	4	1
	FemOther	0	0	1	0	0
	FemSkirt	1	0	2	2	1
	MaleProp	1	0	3	1	0
	MaleStick	0	0	1	3	0
	Round	0	0	2	1	0
	Salamander	1	1	1	0	0
	Thick	0	2	2	0	0
Bisected	Anchor	0	0	0	1	1
	Bisected	0	1	0	0	0
	Phi	2	6	1	2	2
	PolyLobed	1	4	2	3	0
Circular	DotsGroup	1	0	0	0	1
	Lines	1	2	3	2	1
	RayCircle	1	0	0	0	1
Linear	Bars	0	1	1	0	1
	Comb	1	1	1	1	2
	Crook	1	0	1	1	0
	Grid	0	0	0	3	0
	Lines	0	1	0	0	0
	LinesCurved	0	0	1	1	0
	LinesGroup	2	1	2	0	1
	LinesIntersecting	1	2	0	3	0
	Projectile	1	1	2	0	0
	Ramiform	1	2	0	1	3
	RamiformEyed	0	1	0	0	0
	RamiformHead	0	1	0	0	0
	Straight	2	1	1	0	2
	Triangular	0	0	1	1	0
	WavyZigzag	0	0	1	2	0
Zoomorph	Bird	0	0	0	1	0
	Boar	0	1	0	1	0
	Bull	0	0	3	2	1
	BullPoss	0	0	0	1	0
	Caprid	2	4	3	3	2
	CapridPoss	0	1	1	4	1
	Cervid	0	2	3	2	1
	CervidPoss	0	1	0	4	1
	Equid	0	1	1	0	0
	EquidPoss	1	2	1	1	0
	Zoom (Poss.)	2	4	3	3	2
	ZoomIndet	1	2	4	3	4

Table D.2: Table showing the presence of absence of each landscape variable per cluster, and the number of cases which exhibit each variable. Cluster analysis 1 includes the landscape variables and considers the presence of absence of motif types.

Class	Type	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Viewshed	Restricted	6	9	0	2	1
	Wide Vista	0	3	4	7	9
Visibility	Hidden	6	12	2	4	3
	Seen	0	0	2	5	7
Access	Difficult	0	11	2	2	7
	Easy	6	1	2	7	3
Landform	Canyon	6	7	0	2	2
	Peak	0	4	3	2	7
	Valley	0	1	1	5	1
Elevation	High	0	12	2	3	9
	Low	6	0	2	4	1
	Middle	0	0	0	2	0
Shelter	Cave	1	6	0	2	1
	Shelter	5	6	4	7	9
Style	L	1	0	0	0	3
	S	5	10	0	7	7
	LS	0	2	4	2	0

Comparison of sub-clusters

As noted in chapter 7, clusters 2 and 5 exhibit some separation between groups of cases within the cluster. The following tables compare the occurrence of variables within these "sub-clusters".

Table D.3: Table comparing the presence of absence of each motif type within sub-clusters in clusters 2 and 5, cluster analysis 1.

Class	Cluster 2a	Cluster 2b	Cluster 5a	Cluster 5b
Amorphous	4	0	2	2
Linear	2	0	2	3
AnthPossProp	0	0	0	0
AnthPossStick	3	1	2	0
Archer	3	0	0	0
AsexProp	0	0	1	0
AsexStick	1	2	1	0
FemOther	0	0	0	0
FemSkirt	0	0	1	0
MaleProp	0	0	0	0
MaleStick	0	0	0	0
Round	0	0	0	0
Salamander	1	0	0	0
Thick	2	0	0	0
Anchor	0	0	1	0
Bisected	1	0	0	0
Phi	4	2	2	0
PolyLobed	1	3	0	0
DotsGroup	0	0	1	0
Lines	1	1	0	1
RayCircle	0	0	1	0
Bars	1	0	1	0
Comb	1	0	2	0
Crook	0	0	0	0
Grid	0	0	0	0
Lines	1	0	0	0
LinesCurved	0	0	0	0
LinesGroup	1	0	1	0
LinesIntersecting	2	0	0	0
Projectile	1	0	0	0
Ramiform	2	0	3	0
RamiformEyed	1	0	0	0
RamiformHead	1	0	0	0
Straight	1	0	2	1
Triangular	0	0	0	0
WavyZigzag	0	0	0	0
Bird	0	0	0	0
Boar	1	0	0	0
Bull	0	0	1	0
BullPoss	0	0	0	0
Caprid	3	1	2	0
CapridPoss	1	0	1	1
Cervid	2	0	1	0
CervidPoss	1	0	1	0
Equid	1	0	0	0
EquidPoss	2	0	0	0
Zoom (Poss.)	4	0	1	1
ZoomIndet	2	0	4	0

Table D.4: Table comparing the presence of absence of each landscape variable within sub-clusters in clusters 2 and 5, cluster analysis 1.

Class	Cluster 2a	Cluster 2b	Cluster 5a	Cluster 5b
Restricted	3	6	1	0
Wide Vista	3	0	7	3
Hidden	6	6	3	0
Seen	0	0	5	3
Difficult	5	6	5	3
Easy	1	0	3	0
Canyon	1	6	2	0
Peak	4	0	5	3
Valley	1	0	1	0
High	6	6	7	3
Low	0	0	1	0
Middle	0	0	0	0
Cave	4	2	1	0
Shelter	2	4	7	3
L	0	0	3	0
S	4	6	5	3
LS	2	0	0	0

Cluster analysis 2: hierarchical cluster, motif types only

Import data into *rattle*, mark the variables to consider

```
# Note the user selections.

# The following variable selections have been noted.

crs$input <- c("Amorphous", "Linear", "AnthPossProp", "AnthPossStick",
     "Archer", "AsexProp", "AsexStick", "FemOther",
     "FemSkirt", "MaleProp", "MaleStick", "Round",
     "Salamander", "Thick", "Anchor", "Bisected",
     "Phi", "PolyLobed", "DotsGroup", "Lines",
     "RayCircle", "Bars", "Comb", "Crook",
     "Grid", "Lines.1", "LinesCurved", "LinesGroup",
     "LinesIntersecting", "Projectile", "Ramiform", "RamiformEyed",
     "RamiformHead", "Straight", "Triangular", "WavyZigzag",
     "Bird", "Boar", "Bull", "BullPoss",
     "Caprid", "CapridPoss", "Cervid", "CervidPoss",
     "Equid", "EquidPoss", "Zoom..Poss..", "ZoomIndet")

crs$numeric <- c("Amorphous", "Linear", "AnthPossProp", "AnthPossStick",
     "Archer", "AsexProp", "AsexStick", "FemOther",
     "FemSkirt", "MaleProp", "MaleStick", "Round",
     "Salamander", "Thick", "Anchor", "Bisected",
     "Phi", "PolyLobed", "DotsGroup", "Lines",
     "RayCircle", "Bars", "Comb", "Crook",
     "Grid", "Lines.1", "LinesCurved", "LinesGroup",
     "LinesIntersecting", "Projectile", "Ramiform", "RamiformEyed",
     "RamiformHead", "Straight", "Triangular", "WavyZigzag",
     "Bird", "Boar", "Bull", "BullPoss",
     "Caprid", "CapridPoss", "Cervid", "CervidPoss",
     "Equid", "EquidPoss", "Zoom..Poss..", "ZoomIndet")

crs$categoric <- NULL

crs$target  <- NULL
crs$risk    <- NULL
crs$ident   <- NULL
crs$ignore  <- c("WaypointID", "SiteNum", "TotalTypes", "Restricted", "Wide.Vista",
"Hidden", "Seen", "Difficult", "Easy", "Canyon", "Peak", "Valley", "High", "Low",
"Middle", "Cave", "Shelter", "L", "S", "LS")
crs$weights <- NULL

# The 'amap' package provides the 'hclusterpar' function.

require(amap, quietly=TRUE)
```

Perform analysis

```
Hierachical Cluster

Call:
hclusterpar(x = na.omit(crs$dataset[, crs$numeric]), method = "binary",     link = "average", nbproc = 1)

Cluster method   : average
Distance         : binary
```

```
Number of objects: 41

Time taken: 0.02 secs
```

Cluster statistics

```
======================================================================
Cluster means:

     Amorphous    Linear AnthPossProp AnthPossStick Archer AsexProp AsexStick FemOther
[1,] 0.9500000 0.5500000         0.15     0.5500000    0.2      0.2       0.3     0.05
[2,] 0.0000000 0.0000000         0.00     0.0000000    0.0      0.0       0.2     0.00
[3,] 0.0000000 0.1818182         0.00     0.2727273    0.0      0.0       0.0     0.00
[4,] 0.3333333 0.0000000         0.00     0.0000000    1.0      0.0       0.0     0.00
[5,] 0.0000000 0.0000000         0.00     0.0000000    0.0      0.0       1.0     0.00
       FemSkirt   MaleProp MaleStick Round Salamander     Thick Anchor Bisected       Phi
[1,] 0.25000000 0.20000000       0.2  0.15       0.15 0.1000000   0.05     0.05 0.3500000
[2,] 0.00000000 0.00000000       0.0  0.00       0.00 0.0000000   0.20     0.00 0.0000000
[3,] 0.09090909 0.09090909       0.0  0.00       0.00 0.0000000   0.00     0.00 0.5454545
[4,] 0.00000000 0.00000000       0.0  0.00       0.00 0.6666667   0.00     0.00 0.0000000
[5,] 0.00000000 0.00000000       0.0  0.00       0.00 0.0000000   0.00     0.00 0.0000000
     PolyLobed DotsGroup      Lines RayCircle Bars Comb Crook Grid Lines.1 LinesCurved
[1,] 0.3500000      0.05 0.40000000      0.05  0.1  0.2  0.15 0.15    0.05         0.1
[2,] 0.0000000      0.20 0.00000000      0.20  0.2  0.4  0.00 0.00    0.00         0.0
[3,] 0.1818182      0.00 0.09090909      0.00  0.0  0.0  0.00 0.00    0.00         0.0
[4,] 0.0000000      0.00 0.00000000      0.00  0.0  0.0  0.00 0.00    0.00         0.0
[5,] 0.5000000      0.00 0.00000000      0.00  0.0  0.0  0.00 0.00    0.00         0.0
     LinesGroup LinesIntersecting Projectile Ramiform RamiformEyed RamiformHead Straight
[1,]        0.3         0.2000000        0.2      0.2         0.05         0.05     0.25
[2,]        0.0         0.2000000        0.0      0.6         0.00         0.00     0.20
[3,]        0.0         0.0000000        0.0      0.0         0.00         0.00     0.00
[4,]        0.0         0.3333333        0.0      0.0         0.00         0.00     0.00
[5,]        0.0         0.0000000        0.0      0.0         0.00         0.00     0.00
     Triangular WavyZigzag Bird Boar      Bull BullPoss    Caprid CapridPoss     Cervid
[1,]        0.1       0.15 0.05  0.1 0.1500000     0.05 0.3000000 0.30000000 0.20000000
[2,]        0.0       0.00 0.00  0.0 0.0000000     0.00 0.0000000 0.00000000 0.20000000
[3,]        0.0       0.00 0.00  0.0 0.1818182     0.00 0.6363636 0.09090909 0.09090909
[4,]        0.0       0.00 0.00  0.0 0.3333333     0.00 0.3333333 0.00000000 0.66666667
[5,]        0.0       0.00 0.00  0.0 0.0000000     0.00 0.0000000 0.00000000 0.00000000
     CervidPoss Equid EquidPoss Zoom..Poss.. ZoomIndet
[1,]  0.1500000   0.1      0.25   0.55000000 0.4000000
[2,]  0.4000000   0.0      0.00   0.20000000 0.8000000
[3,]  0.0000000   0.0      0.00   0.09090909 0.1818182
[4,]  0.3333333   0.0      0.00   0.33333333 0.0000000
[5,]  0.0000000   0.0      0.00   0.00000000 0.0000000

======================================================================
General cluster statistics:

$n
[1] 41

$cluster.number
[1] 5

$cluster.size
[1] 20  5 11  3  2

$diameter
[1] 5.00000 3.00000 3.00000 2.44949 1.00000
```

```
$average.distance
[1] 3.621725 2.351223 1.901750 2.307209 1.000000

$median.distance
[1] 3.872983 2.547621 1.732051 2.236068 1.000000

$separation
[1] 1.414214 1.414214 1.414214 1.732051 1.414214

$average.toother
[1] 3.254021 2.987115 2.906455 2.983161 2.623605

$separation.matrix
         [,1]     [,2]     [,3]     [,4]     [,5]
[1,] 0.000000 1.414214 1.414214 1.732051 1.414214
[2,] 1.414214 0.000000 1.414214 1.732051 1.414214
[3,] 1.414214 1.414214 0.000000 1.732051 1.414214
[4,] 1.732051 1.732051 1.732051 0.000000 1.732051
[5,] 1.414214 1.414214 1.414214 1.732051 0.000000

$average.between
[1] 3.03763

$average.within
[1] 3.182077

$n.between
[1] 561

$n.within
[1] 259

$within.cluster.ss
[1] 168.9379

$clus.avg.silwidths
           1            2            3            4            5
-0.180247512 -0.074552125  0.022727243  0.009812045  0.491900222

$avg.silwidth
[1] -0.0662067

$g2
NULL

$g3
NULL

$pearsongamma
[1] -0.06908174

$dunn
[1] 0.2828427

$entropy
[1] 1.29843

$wb.ratio
[1] 1.047552
```

```
$ch
[1] 2.13557

$corrected.rand
NULL

$vi
NULL
======================================================================
```

Create .eps file in RStudio

```
# The 'cba' package provides the 'plot' function.

require(cba, quietly=TRUE)

# Generate a dendrogram plot.

postscript(file="hclustDendroSimplesTypes.eps",height=6,width=6,
    horizontal=F,onefile=F,paper="special")

plot(crs$hclust, main="", sub="", xlab="")
title(main="Cluster Dendrogram Simples_R.csv",
    sub=paste("Rattle", format(Sys.time(), "%Y-%b-%d %H:%M:%S"), Sys.info()["user"]))

# Add in rectangles to show the clusters.

rect.hclust(crs$hclust, k=10)

# The 'cba' package provides the 'plot' function.

require(cba, quietly=TRUE)

dev.off()
```

Variable presence or absence per cluster

Table D.5: Table showing the presence of absence of each motif type per cluster, and the number of cases which exhibit each variable. Cluster analysis 2 excludes the landscape variables and considers the presence of absence of motif types per site only.

Class	Type	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6
Amorphous	Amorphous	0	0	1	19	0	0
	Linear	0	0	0	11	2	0
Anthrpomomorph	AnthPossProp	0	0	0	3	0	0
	AnthPossStick	0	0	0	11	1	2
	Archer	0	0	3	4	0	0
	AsexProp	0	0	0	4	0	0
	AsexStick	2	1	0	6	0	0
	FemOther	0	0	0	1	0	0
	FemSkirt	0	0	0	5	1	0
	MaleProp	0	0	0	4	1	0
	MaleStick	0	0	0	4	0	0
	Round	0	0	0	3	0	0
	Salamander	0	0	0	3	0	0
	Thick	0	0	2	2	0	0
Bisected	Anchor	0	1	0	1	0	0
	Bisected	0	0	0	1	0	0
	Phi	0	0	0	7	3	3
	PolyLobed	1	0	0	7	0	2
Circular	DotsGroup	0	1	0	1	0	0
	Lines	0	0	0	8	0	1
	RayCircle	0	1	0	1	0	0
Linear	Bars	0	1	0	2	0	0
	Comb	0	2	0	4	0	0
	Crook	0	0	0	3	0	0
	Grid	0	0	0	3	0	0
	Lines	0	0	0	1	0	0
	LinesCurved	0	0	0	2	0	0
	LinesGroup	0	0	0	6	0	0
	LinesIntersecting	0	1	1	4	0	0
	Projectile	0	0	0	4	0	0
	Ramiform	0	3	0	4	0	0
	RamiformEyed	0	0	0	1	0	0
	RamiformHead	0	0	0	1	0	0
	Straight	0	1	0	5	0	0
	Triangular	0	0	0	2	0	0
	WavyZigzag	0	0	0	3	0	0
Zoomorph	Bird	0	0	0	1	0	0
	Boar	0	0	0	2	0	0
	Bull	0	0	1	3	2	0
	BullPoss	0	0	0	1	0	0
	Caprid	0	0	1	6	7	0
	CapridPoss	0	0	0	6	1	0
	Cervid	0	1	2	4	1	0
	CervidPoss	0	2	1	3	0	0
	Equid	0	0	0	2	0	0
	EquidPoss	0	0	0	5	0	0
	Zoom (Poss.)	0	1	1	11	1	0
	ZoomIndet	0	4	0	8	2	0

Table D.6: Table showing the presence of absence of each landscape variable per cluster, and the number of cases which exhibit each variable. Cluster analysis 2 excludes the landscape variables and considers the presence of absence of motif types per site only.

Class	Type	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6
Viewshed	Restricted	2	1	3	7	2	3
	Wide Vista	0	4	0	13	5	1
Visibility	Hidden	2	3	3	12	4	3
	Seen	0	2	0	8	3	1
Access	Difficult	2	2	3	10	2	3
	Easy	0	3	0	10	5	1
Landform	Canyon	2	1	0	7	4	3
	Peak	0	2	3	10	1	0
	Valley	0	2	0	3	2	1
Elevation	High	2	4	3	10	4	3
	Low	0	0	0	9	3	1
	Middle	0	1	0	1	0	0
Shelter	Cave	1	1	3	3	1	1
	Shelter	1	4	0	17	6	3
Style	L	0	1	0	1	2	0
	S	2	4	2	14	3	4
	LS	0	0	1	5	2	0

Comparison of sub-clusters

As noted in chapter 7, clusters 4 and 5 exhibit some separation between groups of cases within the cluster. The following tables compare the occurrence of variables within these "sub-clusters".

Table D.7: Table comparing the presence of absence of each motif type within sub-clusters in clusters 2 and 5, cluster analysis 1.

Class	Cluster 4a	Cluster 4b	Cluster 5a	Cluster 5b
Amorphous	10	9	0	0
Linear	6	5	2	0
AnthPossProp	3	0	0	0
AnthPossStick	9	2	1	0
Archer	4	0	0	0
AsexProp	3	1	0	0
AsexStick	6	0	0	0
FemOther	1	0	0	0
FemSkirt	4	1	1	0
MaleProp	4	0	1	0
MaleStick	4	0	0	0
Round	3	0	0	0
Salamander	3	0	0	0
Thick	2	0	0	0
Anchor	1	0	0	0
Bisected	1	0	0	0
Phi	5	2	3	0
PolyLobed	6	1	0	0
DotsGroup	1	0	0	0
Lines	7	1	0	0
RayCircle	1	0	0	0
Bars	2	0	0	0
Comb	4	0	0	0
Crook	3	0	0	0
Grid	3	0	0	0
Lines	1	0	0	0
LinesCurved	2	0	0	0
LinesGroup	4	2	0	0
LinesIntersecting	4	0	0	0
Projectile	4	0	0	0
Ramiform	3	1	0	0
RamiformEyed	1	0	0	0
RamiformHead	1	0	0	0
Straight	3	2	0	0
Triangular	2	0	0	0
WavyZigzag	3	0	0	0
Bird	1	0	0	0
Boar	1	1	0	0
Bull	3	0	2	0
BullPoss	1	0	0	0
Caprid	3	3	5	2
CapridPoss	4	2	1	0
Cervid	4	0	1	0
CervidPoss	3	0	0	0
Equid	2	0	0	0
EquidPoss	3	2	0	0
Zoom (Poss.)	7	4	1	0
ZoomIndet	7	1	2	0

Table D.8: Table comparing the presence of absence of each landscape variable within sub-clusters in clusters 2 and 5, cluster analysis 1.

Class	Cluster 4a	Cluster 4b	Cluster 5a	Cluster 5b
Restricted	3	4	1	1
Wide Vista	7	6	4	1
Hidden	6	6	3	1
Seen	4	4	2	1
Difficult	5	5	0	2
Easy	5	5	5	0
Canyon	3	4	2	2
Peak	5	5	1	0
Valley	2	1	2	0
High	5	5	2	2
Low	5	4	3	0
Middle	0	1	0	0
Cave	2	1	1	0
Shelter	8	9	4	2
L	0	1	1	1
S	5	9	2	1
LS	5	0	2	0

Appendix E

Field recording form

Site name __________________ Panel _________________ Date_________

I. Site description and visit details

Site Name							Panel Number	Total # Panels
Province					Town (Término Municipal)			
Visited?	Visit note			Of interest?	Alternate data source			
Date	*Day*	*Month*	*Year*	Time	Weather *comment*			
Existing Coordinates Lat Lon/UTM		Northing		Easting			Source	
Alternate Coordinates Lat Lon/UTM		Northing		Easting			Source	
GPS Accuracy	Datum		Map Name and number				Elevation *(GPS or Map)*	
Dimensions *tape, estimated*	Height		Depth*(dripline)*				Length	
Overall facing orientation			Slope and degree				Accessibility	
Height of lowest element above ground					Panel borders *(any unusual features)*			
Location within site *(datum, structures, features, path, alcove, other panels)*								

II. Geographic context

Landform name		Surrounding land use *(trees, crops, etc.)*	
Geology *(sandstone, limestone,grain size, planes, cracks)*		Landform or location *(cliff top, cliff foot, cave, rockshelter, boulder, bedrock)*	
Water *(direction, distance, type)*	Via pecuaria *(direction, distance)*	Plant community	Habitat
Viewshed description			

III. Motif tally

	Schematic	Levantine	Macroschem.	Petroglyph	Other
Anthropomorph					
Zoomorph					
Curvilinear					
Rectilinear					
Dot/line series					
Other					

IV. Panel description

Site name ___________________ Panel __________________ Date_________

V. Panel sketch

Vertical Profile

Scale

VI. Element key and descriptions

Num.	Style	Color	Class	Height	Width	Cond.	Description *(condition, surface features, superimposition)*

Appendix F

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Appendix G

Motif type definitions

Motif type charts and definitions

Specific Type	Type Definition
Amorphous	Amorphous remnant, no suggested shape
Linear	Amorphous remnant in a linear shape

Anthropomorph types and attributes

Specific Type	Type Definition
AnthPossProp	Possible anthropomorph of indeterminate gender, proportional body
AnthPossStick	Possible anthropomorph of indeterminate gender, stick figure body
Archer	Anthropomorph with apparent bow and or arrow probably male
AsexProp	Anthropomorph of indeterminate gender, proportional body
AsexStick	Anthropomorph of indeterminate gender, stick figure body
FemOther	Anthropomorph identified as female in literature but without skirt or breasts
FemSkirt	Anthropomorph identified as female in literature or with skirt or breasts
MaleProp	Anthropomorph identified as male in literature or phallic, proportional body
MaleStick	Anthropomorph identified as male in literature or phallic, stick figure body
Round	Anthropomorph identified as female in literature, with round body but no clothing
Round	Anthropomorph identified as female in literature or with skirt or breasts
Salamander	Salamander, or with outstretched arms and defined fingers, sometimes long tail or phallus
Thick	Anthropomorph identified as female in literature, with thick line body but no clothing

Anthropomorph attribute definitions

Body	**Body definition**
Anchor	Horizontal line curving downward, bisected by vertical line
Bisected	Horizontal line, not necessarily curved, bisected by vertical line
Branch	Vertical line with one or more additional lines branching from top or bottom
Cross	Perpendicular lines in cross shape
Elongated	Proportional body with elongated torso
Line group	Group of intersecting or adjacent lines which suggest a stick figure anthropomorph
Proportional	Naturalistic or lines of varying widths consistent with naturalistic paintings
Round	Rounded body with detailed arms and legs
Salamander	Arms and legs extend vertically, or horizontally then angled up or down, with defined fingers
Stick	Central vertical crossing horizontal or angled lines at top and bottom, appear to be finger painted, no details
Thick line	Thickly painted lines with irregular borders

Clothing	**Clothing definition**
Bracelets	Short lines perpendicular to arms
Cape	Lines extending from shoulder or arm
Skirt, long	Triangular lower half with short legs below
Skirt, possible	Indistinct area which appears to be skirt
Skirt, short	Short triangular area with long legs below (kilt?)
Trouser	Thicker line legs with distinct difference in width between lower and upper halves

Head shape	**Head shape definition**
Anchor-like	Resembling downturned horns
Branching	Two or more branching lines from the head, resembling feathers, rays, or antlers
Elongated	Elongated line extending from arm intersection
Flat	Horizontal line over the top of the head
Rounded	Rounded, loop-like, or exagerrated head
Triangular	Large headdress ending in point

Idol-like and abstract motif types and attributes

Specific Type	Type Definition
Anchor	Tree-like or ancoriform (curvilinear area, usually like an upside-down U, with a vertical bisecting line)
Bisected	Other motifs bisected by vertical line, with an irregular shape
PhiLike	Circle (single) bisected by vertical line, sometimes with embellishments
PhiLikePoss	Circle (single) bisected by vertical line, sometimes with embellishments, possible
PolyLobed	Multiple or “stacked” circles, often bisected by vertical line
DotsGroup	Dots close together on panel but no obvious connection or motif
RayCircle	Circle with short lines extending outward (star- or sun-like)
Bars	Thick lines, generally appear to be complete motifs
Comb	Pectiniform, Rake- or comb-like, parallel vertical lines with bar over the top
Crook	Line with shorter hook or curve at one end, usually diagonal on panel
Grid	Lines intersecting in grid pattern
Lines	Circular or curving lines, not obviously a phi-like or poly-lobed motif (not star- and sun-like motifs)
Lines	Remnant in a linear shape
LinesCurved	One or more curved lines
LinesGroup	Lines close together on panel but no obvious connection or motif
Lines Intersecting	Groups of intersecting lines of various orientation and number
Projectile	Linear motif associated with anthropomorph
Ramiform	Branching or branch-like; a central vertical line with “arms” on either side
RamiformEyed	Branching or branch-like; a central vertical line with “arms” on either side, with “eyes” or dots on either side of central line
RamiformHead	Branching or branch-like; a central vertical line with “arms” on either side, with additional line or emphasized “head”
Straight	Straight line
Triangular	Triangular areas
WavyZigzag	Wavy or zigzag lines

Zoomorph motif types

Specific Type	**Type Definition**
Bird	Bird
Boar	Zoomorph with short legs and no or short tail; possibly a boar
Bull	Zoomorph with horns or hump or the horns alone
BullPoss	Zoomorph with possible horns or hump or the horns alone
Caprid	Zoomorph with apparent upright or curved horns, not lunate
CapridPoss	Zoomorph with apparent upright or curved horns, not lunate, possible
Cervid	Zoomorph with branching antlers
CervidPoss	Zoomorph which appears to have branching antlers
Equid	Zoomorph identified as equid in literature
EquidPoss	Zoomorph identified as equid in literature, possible
Quadruped	Zoomorph of indeterminate species
ZoomPoss	Appears to be remains of a quadruped animal (generically comprised of head with ears, horns, or antlers, body, tail, four legs)

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